INDIAN AGRICULTURAL
RESEARCH INSTITUTE, NEW DELHI.

I.A.R.I. 6.
MGIPC—S1—6 AR/54—7-7-54—10,000.

NOTULAE NATURAE

OF

THE ACADEMY OF NATURAL SCIENCES
OF PHILADELPHIA
(Founded 1812)

NUMBERS 101 TO 200
1942 — 1947

PHILADELPHIA
1947

LIST OF TITLES

Notulae Naturae, Nos. 101-200

No

101. Results of the Chilean Mineralogical Expedition of 1938. Part VII.—The Crystallography of Alunogen, Meta-alunogen, and Pickeringite, by Samuel G. Gordon. Pp. 1-9, 6 figs. Published July 3, 1942
102. The Crystallography of Fibroferrite, by Samuel G. Gorden. Pp. 1-2, 1 fig. Published July 3, 1942
103. Results of the Chilean Mineralogical Expedition of 1938. Part VIII.—The Crystallography of Ferrinatrite, by Samuel G. Gordon Pp. 1-4, 3 figs. Published July 3, 1942
104. A New Species of Frog (Eleutherodactylus) from Costa Rica, by Emmett Reid Dunn. Pp. 1-2. Published July 3, 1942
105. New Birds from Bolivia. Part V, by James Bond and Rodolphe Meyer de Schauensee. Pp. 1-4. Published July 7, 1942
106. A New Floridan Calliostoma (Astele), by Jeanne S. Schwengel. Pp. 1-2, 1 fig. Published Aug 26, 1942
107. Descriptions of Six New Fresh-water Fishes (Cyprinidae and Percidae) from the Southeastern United States, by Henry W. Fowler. Pp. 1-11, 11 figs. Published Sept. 16, 1942
108. New or Noteworthy Snakes from Panama, by Emmett Reid Dunn Pp 1-8. Published Sept. 17, 1942
109. An Edentate from the Oligocene of Wyoming, by Edwin H. Colbert Pp. 1-16. 3 figs., 1 pl. Published Nov. 3, 1942
110. A New South African Bird-locust of the Genus Anacridium (Orthoptera, Acrididae, Cyrtacanthacridinae), James A. G. Rehn. Pp. 1-7, 10 figs. Published Oct. 29, 1942
111. Notes on a Stranded Pigmy Sperm Whale (Kogia Breviceps), by Robert K. Enders. Pp. 1-6, 7 figs. Published Nov. 12, 1942
112. Autopsy of a Male Pigmy Sperm Whale (Kogia Breviceps), by Herbert L. Ratcliffe. Pp. 1-4. Published Nov. 12, 1942
113. The Phloxes of Nevada, by Edgar T. Wherry. Pp. 1-11, 3 figs. Published Nov. 20, 1942
114. Description of a New Copsychus from the Batu Islands, by S. Dillon Ripley. P. 1. Published Jan. 28, 1943
115. Description of a New Goby from the Fiji Islands, by Henry W. Fowler Pp. 1-3, 3 figs. Published Mar. 26, 1943
116. Mammal Footprints from the White River Oligocene, by Robert G. Chaffee. (Contains a note on the stratigraphy of the Whitman locality.) Pp. 1-13, 3 figs., 2 pls. Published April 16, 1943
117. A New Poeciliid Fish from Honduras, by Henry W. Fowler. Pp. 1-3, 3 figs. Published April 1, 1943
118. Pliocene and Pleistocene Mollusks from the Santee-Cooper Area, South Carolina, by Horace G. Richards. Pp. 1-7, 13 figs. Published April 9, 1943
119. Two New Characins from Eastern Ecuador, by Henry W. Fowler. Pp. 1-5, 2 figs Published March 30, 1943
120. Zoological Results of the Second Bolivian Expedition for The Academy of Natural Sciences of Philadelphia 1936-1937. Part II.—Additional New Fishes, by Henry W. Fowler. Pp. 1-7, 4 figs. Published April 1, 1943
121. Descriptions of New Genera and Species of the Dipterous Family Ephydridae. Paper XIII, by Ezra T. Cresson, Jr. Pp. 1-4. Published April 9, 1943

122. A New Species of Dove of the Genus Leptotila from Colombia, by James Bond and Rodolphe Meyer de Schauensee. Pp. 1-2. Published May 18, 1943
123. Zoological Results of the Azuero Peninsula Panama Expedition of 1940. Part I.—A New Species of Peripatus, by Emmett Reid Dunn. Pp. 1-5. Published June 25, 1943
124. A Lower Jaw of Clepsysaurus and its Bearing Upon the Relationships of this Genus to Machaeroprosopus, by Edwin H. Colbert. Pp. 1-8, 3 figs. Published Sept. 21, 1943
125. A New Genus and Two New Species of Hispaniolan Pseuodphyllinae (Orthoptera; Tettigoniidae), by James A. G. Rehn. Pp. 1-14, 10 figs Published Aug. 6, 1943
126. A New Race of Ameiva Festiva from Colombia, by Emmett Reid Dunn. Pp. 1-2. Published Sept. 28, 1943
127. A New Flycatcher of the Genus Myiophobus from Peru, by James Bond. Pp. 1-2. Published Sept. 30, 1943
128. Pelmatodrilus Planariformis, a New Oligochaete (Enchytraeidae) Modified for Epizootic Life on Jamaican Earthworms, by J. Percy Moore. Pp. 1-7. Published Oct. 29, 1943
129. The Occurrence of Cercaria Clausii Monticelli, a Marine Rattenkonig Larval Trematode, on the West Coast of Florida, by R. M. Cable and Richard A. McLean. Pp. 1-7, 1 pl. Published Oct. 29, 1943
130. Description of a New Genus and Species of Apogonid Fish from New Jersey, by Henry W. Fowler Pp. 1-4, 1 fig. Published April 28, 1944
131. The Genera Aplatacris and Thrasyderes (Orthoptera; Acrididae; Romaleinae; Tropidacres), by James A. G. Rehn. Pp. 1-12, 4 figs. Published April 28, 1944
132. Well-boring at Brandywine Lighthouse in Delaware Bay. Part I.—Geology and Macrofossils, by Horace G. Richards and Anne Harbison. Pp. 1-14, 11 figs. Published May 12, 1944
133. Well-boring at Brandywine Lighthouse in Delaware Bay. Part II.—Miocene Diatoms, by Ruth Patrick. Pp. 1-13, 1 pl. Published May 12, 1944
134. Notes on the Geology and Paleontology of the Cape May Canal, New Jersey, by Horace G. Richards. Pp. 1-12, 8 figs. Published June 14, 1944
135. Descriptions of New Genera and Species of the Dipterous Family Ephydridae. Paper XIV, by E. T. Cresson, Jr. Pp. 1-9 Published June 21, 1944
136. Notes on Naidomorph Oligochaeta of Philadelphia and Vicinity, by Y. Chen. Pp. 1-8, 3 figs. Published June 21, 1944
137. South African Bird-Locust Records and Notes (Orthoptera; Acrididae; Cyrtacanthacridinae; Group Cyrtacanthacres), by James A. G. Rehn. Pp. 1-11. Published June 21, 1944
138. A New Race of Pyrrhura Rupicola from Peru, by James Bond and Rodolphe Meyer de Schauensee. Pp. 1-2. Published June 28, 1944
139. New Pelecypoda from the Yorktown Formation of Virginia, by Cecil B. McGavock, Jr. Pp. 1-3, 12 figs. Published June 28, 1944
140. Notes on Colombian Parrots, by Rodolphe Meyer de Schauensee. Pp. 1-5. Published June 28, 1944
141. Notes on Colombian Woodpeckers, with the Description of a New Form, by Rodolphe Meyer de Schauensee. Pp 1-3. Published June 28, 1944
142. Description of a New Genus and a New Species of American Stromateid Fishes, by Henry W. Fowler. Pp. 1-4, 2 figs. Published June 30, 1944
143. Mollusks from the Eocene Santee Limestone, South Carolina, by Anne Harbison. Pp. 1-12, 4 pls. Published July 7, 1944
144. Notes on Colombian Birds, with a Description of a New Form of Zenaida, by Rodolphe Meyer de Schauensee. Pp. 1-4. Published Oct. 13, 1944
145. The Generic Position of Certain Mexican Pompilidae (Hymenoptera), with Description of a New Genus, by James Chester Bradley. Pp. 1-12. Published Oct. 18, 1944.
146. New Phloxes from the Rocky Mountains and Neighboring Regions, by Edgar T. Wherry. Pp. 1-11, 6 figs. Published Oct. 25, 1944

147. Some Chilopods from the Indo-Australian Archipelago, by Ralph V. Chamberlin. Pp. 1-14, 15 figs. Published Nov. 10, 1944
148. Additional Notes on West Indian Birds, by James Bond. Pp. 1-4. Published March 9, 1945
149. Three New Species of the Reticulosa Group of the Blattid Genus Cariblatta (Orthoptera, Blattidae, Pseudomopinae), by James A. G. Rehn. Pp. 1-15, 12 figs. Published March 14, 1945
150. A New Genus and Species of Phaneropterinae from Eastern Peru (Orthoptera; Tettigoniidae), by James A. G. Rehn Pp. 1-7, 6 figs. Published March 28, 1945
151. On a Collection of Reptiles from Eritrea, by Arthur Loveridge. Pp 1-4. Published March 28, 1945.
152. A New Snail from the Devonian Hamilton Group, by B. F. Howell. Pp. 1-2, 3 figs. Published April 4, 1945
153. Notes on Colombian Antbirds, Ovenbirds and Woodhewers, with the Description of a New Form from Peru, by Rodolphe Meyer de Schauensee Pp. 1-15. Published May 23, 1945
154. A New Small Reptile from the Triassic of Pennsylvania, by Wilhelm Bock. Pp. 1-8, 2 figs. Published May 23, 1945
155. A New Genus and Species of Locust of the Group Euthymiae (Orthoptera, Acrididae, Cyrtacanthacridinae) from South Africa, by James A. G. Rehn. Pp. 1-7, 7 figs. Published July 13, 1945
156. Notes on Buteo Magnirostris, with a Description of a New Form from Peru, by Rodolphe Meyer de Schauensee. Pp. 1-4. Published Aug. 1, 1945
157. Orthoptera from Ulithi Atoll, Western Carolina Islands, with the Description of a New Subspecies of Valanga, by James A. G. Rehn. Pp. 1-11, 8 figs. Published Aug. 1, 1945.
158. Descriptions of Two Fresh-Water Fishes from Colombia, by Henry W. Fowler. Pp. 1-11, 15 figs. Published Nov. 2, 1945
159. Descriptions of Seven New Fresh-Water Fishes from Peru, by Henry W. Fowler. Pp. 1-11, 15 figs. Published Nov. 2, 1945
160. Notes on a Cretaceous Fresh-Water Gastropod from Southwestern Utah, by Teng-Chien Yen. Pp. 1-3, 4 figs. Published Dec. 28, 1945
161. Colombian Zoological Survey. Part II.—Notes on Colombian Crows, Wrens, and Swallows, by Rodolphe Meyer de Schauensee. Pp. 1-14. Published Jan. 16, 1946
162. The Type Specimens of C. B. Adams's Jamaican Species of Vitrinella, by Henry A. Pilsbry. Pp. 1-5, 6 figs. Published Jan. 18, 1946
163. Colombian Zoological Survey. Part III. — Notes on Colombian Birds, by Rodolphe Meyer de Schauensee. Pp. 1-9. Published Jan. 23, 1946
164. A New Ordovician Asaphid Trilobite from Pennsylvania, by B. F. Howell. Pp. 1-3, 1 fig. Published Jan. 25, 1946
165. Notes on A Collection of Fishes from Trinidad. by Henry W. Fowler. Pp. 1-11, 4 figs. Published Jan. 30, 1946
166. On Lower Cretaceous Fresh-Water Mollusks of Sage Creek, Wyoming, by Teng-Chien Yen. Pp. 1-13, 13 figs. Published Feb. 15, 1946
167. Colombian Zoological Survey. Part IV.—Further Notes on Colombian Birds, with the Description of New Forms, by Rodolphe Meyer de Schauensee. Pp. 1-13. Published Feb. 20, 1946
168. Notes on the Anatomy of Australian and Galapagos Bulimulidae (Mollusca, Pulmonata), by Henry A. Pilsbry. Pp. 1-4, 4 figs. Published Feb. 25, 1946
169. On Some Forms of Parus Major Found in Eastern and Southern Asia, by Rodolphe Meyer de Schauensee Pp. 1-9. Published Feb. 25, 1946
170. Diatoms from Patschke Bog, Texas, by Ruth Patrick. Pp. 1-7, 3 figs. Published Feb. 28, 1946
171. New Pemphilidine Wasps, with Notes on Previously Described Forms. I. Ectemnius (Hymenoptera: Sphecidae), by V. S. L. Pate. Pp. 1-14. Published March 26, 1946

172. A New Species of Fossil Shark from New Jersey, by M. Dorothy Reed. Pp. 1-3, 4 figs. Published March 29, 1946
173. Notes on Birds of Northern Siam, by H. G. Deignan. Pp. 1-15, Published May 1, 1946
174. Notes on Two Collections of Birds From North-Central Siam, by H. G. Deignan. Pp. 1-10 Published May 10, 1946
175. The Genus Monoclona Mik (Diptera: Mycetophilidae), by Elizabeth G. Fisher. Pp. 1-4, 5 figs. Published May 10, 1946
176. The Birds of Mona Island, by James Bond. Pp 1-10 Published May 15, 1946
177. A Gastropod of the Genus Velates from The Florida Eocene, by Horace G. Richards. Pp. 1-6, 4 figs Published May 24 1946
178. Zoological Results of the George Vanderbilt African Expedition of 1934. Part XI.—A New Pipunculus from Africa (Pipunculidae, Diptera), by William F. Rapp, Jr. Pp 1-2, 2 figs. Published June 21, 1946
179. Species of Stemodia and Galvezia (Scrophulariaceae) on the Coast of Ecuador and Northern Peru, by Francis W. Pennell. Pp. 1-6. Published June 21, 1946
180. Description of a New Deep-Water Angler (Chaunacidae) from off New Jersey, by Henry W. Fowler Pp 1-4, 6 figs Published June 21, 1946
181. Notes on Bahama Fishes with a Description of a New Jaw Fish (Opisthognathidae), by Henry W. Fowler. Pp. 1-8, 1 fig. Published June 28, 1946
182. A New Species of Wren from Colombia, by Rodolphe Meyer de Schauensee. Pp. 1-2. Published Oct. 9, 1946
183. New Crustaceans from the Lockatong of the Newark Series, by Wilhelm Bock. Pp. 1-16, 5 figs. Published Oct. 30, 1946
184. The Anatomy and Systematic Position of Myzobdella Lugubris Leidy (Hirudinea), by J. Percy Moore. Pp. 1-12, 3 figs. Published Nov 13, 1946
185. New Pemphilidine Wasps, with Notes on Previously Described Forms: II. (Hymenoptera: Sphecidae), by V. S L. Pate. Pp. 1-14. Published Jan. 15, 1947.
186. On the Genera Automolus (Furnariidae) and Myrmeciza (Formicariidae) in Colombia, by Rodolphe Meyer de Schauensee. Pp. 1-5. Published Feb. 14, 1947
187. New Taxonomic Names of Fish-Like Vertebrates, by Henry W. Fowler. Pp. 1-16. Published Feb. 21, 1947
188. Melanoplus Plebejus, Including Two New Subspecies (Orthoptera: Acrididae: Cyrtacanthacridinae), by H. Radclyffe Roberts. Pp. 1-6, 12 figs. Published Feb. 28, 1947
189. The Bull-Eye (Cookeolus Boops) from off the New Jersey Coast, by Henry W. Fowler. Pp. 1-3, 1 fig. Published March 14, 1947
190. New Pemphilidine Wasps, with Notes on Previously Described Forms: III. (Hymenoptera: Sphecidae), by V. S. L. Pate. Pp. 1-6, 5 figs Published March 25, 1947
191. Description of a New Species and Genus of Darter from the Cape Fear River Basin of North Carolina, by Henry W. Fowler. Pp. 1-3, 1 fig. Published March 28, 1947
192. A New Genus and Species of Nocturnal Wasps (Hymenoptera: Mutillidae: Chyphotini), by V. S. L. Pate. Pp. 1-4, 1 fig. Published April 9, 1947
193. A New Genus and Species of Curculionidae (Coleoptera) in Baltic Amber, by Titus Ulke. Pp 1-7, 10 figs. Published April 25, 1947
194. Aeshna Psilus, A New Species of the Group of AE. Cornigera Brauer (Odonata: Aeshnidae), by Philip P. Calvert. Pp 1-11, 2 figs. Published May 9, 1947
195. A Revision of the Pelecypod Family Tridacnidae, by Richard A. McLean. Pp. 1-7, 12 figs. Published June 13, 1947
196. Two New Tyrant Flycatchers from Peru, by James Bond. Pp. 1-2. Published June 13, 1947
197. The Barreto—Gobioides Broussonnetii Lacépède—Obtained in Florida by Captain William B. Gray, by Henry W. Fowler. Pp. 1-4, 1 fig. Published July 25, 1947
198. A New Genus and Two New Species of Neotropical Pseudophyllinae (Orthoptera: Tettigoniidae), by James A. G. Rehn. Pp. 1-12, 6 figs. Published Sept. 12, 1947

199. Notes on Bahama Fishes Obtained by Mr. Charles G. Chaplin in 1947, with Descriptions of Two New Species, by Henry W. Fowler. Pp. 1-14, 10 figs. Published Sept. 12, 1947
200. Oligocene and Lower Miocene Microfossils from Onslow County, North Carolina, by James D. McLean, Jr. Pp. 1-9. Published December 12, 1947.

AUTHOR INDEX

Bock, Wilhelm. Nos. 154, 183
Bond, James. Nos. 127, 148, 176, 196
Bond, James and Rodolphe Meyer de Schauensee. Nos. 105, 122, 138
Bradley, James Chester. No. 145
Cable, R. M and Richard A. McLean. No. 129
Calvert, Philip P. No. 194
Chaffee, Robert G. No. 116
Chamberlin, Ralph V. No. 147
Chen, Y. No. 136
Colbert, Edwin H. Nos. 109, 124
Cresson, Ezra T., Jr. Nos. 121, 135
Deignan, H. G. Nos. 173, 174
De Schauensee, Rodolphe Meyer. Nos. 140, 141, 144, 153, 156, 161, 163, 167, 169, 182, 186 (See also Bond and de Schauensee.)
Dunn, Emmett Reid. Nos. 104, 108, 123, 126
Enders, Robert K. No. 111
Fisher, Elizabeth G. No. 175
Fowler, Henry W. Nos. 107, 115, 117, 119, 120, 130, 142, 158, 159, 165, 180, 181, 187, 189, 191, 197, 199
Gordon, Samuel G. Nos. 101, 102, 103
Harbison, Anne. No. 143 (See also Richards and Harbison.)
Howell, B. F. Nos. 152, 164
Loveridge, Arthur. No. 151
McGavock, Cecil B., Jr. No. 139
McLean, James D. No. 200
McLean, Richard A. No. 195 (See also Cable and McLean.)
Moore, J. Percy. Nos. 128, 184
Pate, V. S. L. Nos. 171, 185, 190, 192
Patrick, Ruth. Nos. 133, 170
Pennell, Francis W. No. 179
Pilsbry, Henry A. Nos. 162, 168
Rapp, William F., Jr. No. 178
Ratcliffe, Herbert L. No. 112
Reed, M. Dorothy. No. 172
Rehn, James A. G. Nos. 110, 125, 131 137, 149, 150, 155, 157, 198
Richards, Horace G. Nos. 118, 134, 177
Richards, Horace G. and Anne Harbison. No. 132
Ripley, S. Dillon. No. 114
Roberts, H. Radclyffe. No. 188
Schwengel, Jeanne S. No. 106
Ulke, Titus. No. 193
Wherry, Edgar T. Nos. 113, 146
Yen, Teng-Chien. Nos. 160, 166

NOTULAE NATURAE

NUMBER 101 OF JULY 3, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

RESULTS OF THE CHILEAN MINERALOGICAL EXPEDITION OF 1938.* PART VII.—THE CRYSTALLOGRAPHY OF ALUNOGEN, META-ALUNOGEN, AND PICKERINGITE

BY SAMUEL G. GORDON

Associate Curator of Mineralogy and Petrography, The Academy of Natural Sciences of Philadelphia

The rarity of measurable crystals of the not uncommon mineral alunogen is evinced by the fact that the crystallographic data on this alum is comprised in a single paper by Hlawatsch[1] based on the measurement of a few poor crystals showing in all but 7 forms. An artificial crystal had an additional form, which was shown in a figure of an idealized crystal. Twinning on *b* (010) was illustrated by a figure and a gnomonic projection of an artificial crystal. His study was based on a specimen from Opálbánya (Czerwenitza) in the Naturhistorisches Staatsmuseum in Vienna.

The officials of the Oficina Maria Elena of the Anglo-Chilean Nitrate Corporation very kindly furnished a guide, affording the writer an opportunity of visiting the alum mines 3.5 km. south of the village of Francisco de Vergara, where alum minerals are mined for shipment to Santiago for water purification. Veins of colorless granular alunogen and shrimp-pink acicular pickeringite occur in much altered andesite on the north side of the hill. Such veins may reach a width of 15 cm. or more, with the acicular structure of pickeringite perpendicular to the walls of the vein. The veins may be half alunogen and half pickeringite, the latter apparently replacing the former locally. Where the alunogen has been exposed to the dry desert air, it has become white and pulverulent. On the south side of the hill the veins are composed entirely of white, pulverulent kieserite.

The unaltered alunogen is water-clear, and colorless with a granular structure. The anhedral grains show a perfect pinacoidal cleavage (*b* 010), and measure up to 1 cm. in length, with a diameter up to 2 mm. in width. The elongation of the grains is in the direction perpendicular to the walls of the vein, and this parallelism is strikingly shown in cleavage masses of the mineral.

Distinct crystals of alunogen and pickeringite were found in small cavities where the alums had suffered solution, particularly about andesite inclusions in the veins. The alunogen crystals were tabular, parallel to *b* (010), up to 2 mm. in length, and resembled crystals of tamarugite in appearance and habit.

---

* This expedition was made possible by the generous financial aid of Mr. Charles M. B. Cadwalader, President of the Academy of Natural Sciences of Philadelphia and a grant-in-aid from the Eldredge Reeves Johnson Fund of the American Philosophical Society. Parts I-VI appeared as Notulae Naturae Nos. 57, 64, 69, 72, 80, and 97.

Half a dozen measurable crystals were found, showing in all 56 forms. The forms were in but five zones, all including the pinacoid b (010): with indices hk0, 0kl, 1kl, $\bar{1}$kl, and $\bar{2}$kl. The crystals had suffered from solution, and the faces of a whole zone were often found to be rounded, or represented by only a section of a few faces. The parts of the zones that remained, however, were usually perfect and gave good signals.

Results of the measurements are given in Table I, with new elements and calculated angles based upon averaging of the forms giving the best signals. The usual habit is shown in Figure 1. Included in Table I are the forms found by Hlawatsch [1], with his symbols and those of the new orientation. The new orientation differs from that of Hlawatsch in the doubling of the q_0 ordinate of the gnomonic net.

TABLE I. ANGLES OF ALUNOGEN

Triclinic; pinacoidal — $\bar{1}$

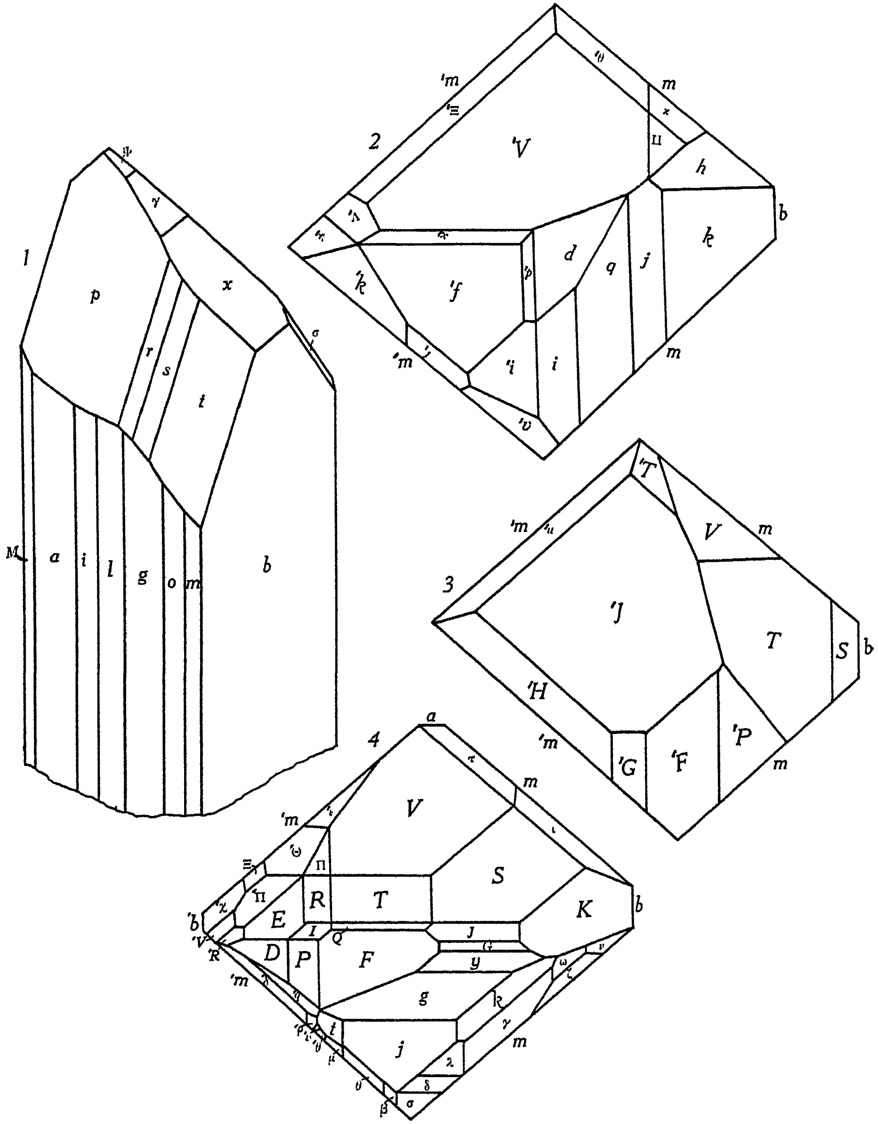
$a : b : c = 0\,8355 : 1 : 0\,6752;\ \alpha = 89°58', \beta = 97°26', \gamma = 91°52'$

$p_0 : q_0 : r_0 = 0.8086 : 0.6699 : 1;\ \lambda = 89°48', \mu = 82°34', \nu = 88°08'$

$p_0' = 0.8155;\ q_0' = 0.6756.\ x_0' = 0.1305,\ y_0' = 0.0035$

Symbol		Faces measured	Measured Angles		Calculated Angles		Hlawatsch Symbols
			ϕ	ρ	ϕ	ρ	
c	001	1	88°36′	7°29′	88°28′	7°26′	
b	010	12	00°00′	90°00′	00°00′	90°00′	*b* 010
a	100	4	88°17′	90°00′	88°08′	90°00′	*a* 100
k	120	2	30°04′	90°00′	30°17′	90°00′	
l	230	1	38 10	“	38 05	“	
m	110	2	49 24	“	49 15	“	
n	320	1	59 49	“	59 40	“	
o	530	1	62 59	“	62 04	“	
f	310	1	72 56	“	72 50	“	
g	410	1	76 04	“	76 31	“	
h	920	1	78 01	“	78 13	“	
i	610	1	80 25	“	80 19	“	
F	$3\bar{1}0$	1	103 34	“	104 24	“	
Z	$5\bar{2}0$	1	106 58	“	106 39	“	*m* $1\bar{1}0$
N	$2\bar{1}0$	1	110 43	“	110 56	“	
O	$5\bar{3}0$	2	114 08	“	114 56	“	
Y	$3\bar{2}0$	1	117 05	“	116 56	“	

Symbol		Faces measured	Measured Angles		Calculated Angles		Hlawatsch Symbols
			ϕ	ρ	ϕ	ρ	
M	$1\bar{1}0$	3	128°20′	90°00′	128°32′	90°00′	
I	$7\bar{9}0$	2	136 48	“	135 56	“	
K	$3\bar{5}0$	2	143 12	“	143 27	“	
L	$4.\overline{11}.0$	2	155 24	“	156 16	“	
J	$1\bar{3}0$	1	159 41	“	157 50	“	
α	013	1	30°06′	14°34′	29°43′	14°35′	
β	023	1	15 56	25 17	16 02	25 17	
q	011				10 52	34 41	*q* 021
ψ	043	2	8 18	42 21	8 13	42 24	
γ	053	1	7 28	48 53	6 35	48 42	
x	021	1	5 37	53 37	5 29	53 47	
δ	$0\bar{1}3$	1	149 35	14 22	149 31	14 26	
ϵ	$0\bar{2}3$	2	163 52	25 06	163 43	24 58	
W	$0\bar{1}1$	1	169 13	34 32	169 01	34 25	
ζ	$0\bar{4}3$	1	171 50	42 18	171 44	42 14	
η	$0\bar{5}3$	1	173 28	48 30	173 22	48 20	
X	$0\bar{2}1$	1	174 32	53 47	174 28	53 32	
d	323				64 03	46 27	*d* 111
p	111	2	54 22	49 33	53 21	49 41	
r	353	1	39 45	56 13	39 14	56 13	
s	373	1	30 51	61 46	30 29	61 47	
t	131	1	25 14	66 07	24 41	66 10	
P	$1\bar{1}1$	1	124 03	48 54	124 19	48 53	
U	$3\bar{4}3$	1	132 37	52 15	132 24	52 01	
R	$3\bar{5}3$	1	139 09	55 30	139 13	55 22	
S	$3\bar{7}3$	1	148 24	61 13	147 22	60 18	
c	$\bar{3}\bar{1}3$				—109 56	36 04	*e* $\bar{1}\bar{1}1$
φ	$\bar{3}\bar{4}3$	1	—142 59	49 08	—143 27	48 59	
Υ	$\bar{3}\bar{5}3$	1	—148 55	53 17	—149 13	53 13	
τ	$\bar{1}\bar{2}1$	1	—154 42	56 42	—153 31	56 30	
σ	$\bar{1}\bar{3}1$	1	—161 54	65 08	—161 19	64 55	
ρ	$\bar{3}.\overline{10}\ 3$	1	—164 05′	66 50	—163 07	67 02	
θ	$\bar{3}13$	1	—74 05	35 48	73 33	35 27	
w	$\bar{1}11$	1	—46 39	43 35	46 22	43 24	*w* $\bar{1}21$
x	$\bar{3}53$	1	—29 29	52 55	31 50	52 23	
r	$\bar{1}21$				—27 16	56 13	*r* $\bar{1}41$
ξ	$\bar{3}73$	1	—23 26	60 01	—23 47	59 30	
z	$\bar{2}01$	1	—92 03	56 30	—92 10	56 18	
ω	$\bar{6}13$	1	—83	57	—83 20	56 29	
χ	$\bar{6}23$	1	—75 42	57 22	—75 02	56 36	
π	$\bar{6}43$	1	—60 50	59 52	—60 25	59 53	
λ	$\bar{6}\bar{1}3$	1	—100 04	56 52	—99 24	56 13	
	$\bar{6}\bar{2}3$	1	—108 20	57 53	—107 31	57 33	

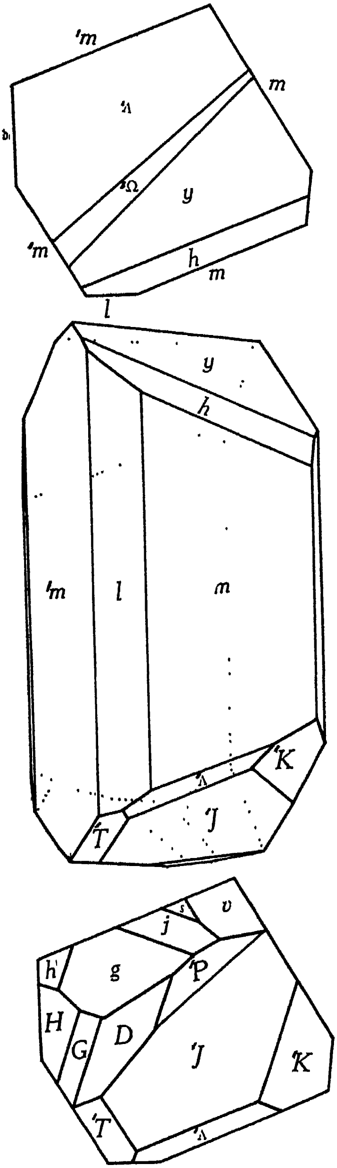


Alunogen and Pickeringite, Francisco de Vergara, Chile.

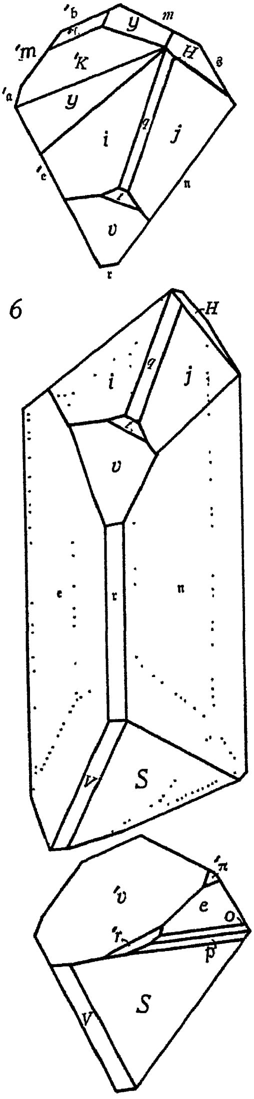
Fig. 1.—Alunogen. Figs. 2-6.—Pickeringite. (Figs. 2-4 show top view only.)

In general, capital letters indicate negative forms (F, G, D etc.), and lower case letters, positive forms (f, g, d etc.). Left forms ('f, 'p, 't, etc.) are distinguished by prime marks to the left of the letters, from the right forms which are unmarked.

5


'm
m
'Λ
b
'Ω
y
'm
h
m
l
y
h
'm
l
m
'Λ
'K
'T
'J
v
j
h
g
'P
H
G
D
'J
'K
'T
'Λ

6


'b
y
m
'm
'K
H
a
'a
y
i
q
j
'e
n
v
r
H
i
q
j
v
e
r
n
V
S
'π
'v
e
o
'r
p
V
S

ALUNOGEN AND META-ALUNOGEN

The colorless, triclinic alunogen dehydrates very readily on exposure to a white, monoclinic mineral, pseudomorphous after alunogen, hereafter designated as meta-alunogen. Analyses of the two minerals by William Pitman and Paul Collins are given in Table II, in which their optical properties are contrasted.

TABLE II.—ANALYSES OF ALUNOGEN AND META-ALUNOGEN

	I ALUNOGEN	II. META-ALUNOGEN
	$Al_2O_3.3SO_3.16H_2O$	$Al_2O_3.3SO_3.13\frac{1}{2}H_2O$
	Triclinic	Monoclinic
	Colorless, vitreous	White, waxy or pearly
Al_2O_3	16.17	17.33
MgO	nil	
Na_2O	.01	
SO_3	37.35	41.04
H_2O	46.10	41.44
	99.62	99.81
Sp. gr.	1.77	
Optically	+	+
	1.459	1.469
	1.463	1.473
	1.473	1.491
2E	45°	large
	$Bx_{ac} \perp$ cleavage trace	$Bx_{ob} \perp$ cleavage

The white meta-alunogen is found to be colorless on examination under the microscope, but more cracked than the colorless alunogen. The white appearance of the meta-alunogen is due to the splitting up, principally along cleavage directions of the alunogen as water is lost. This alteration is at first superficial, and complete alteration to meta-alunogen takes considerable time.

Clear, colorless alunogen on crushing and air-drying was found to lose water to the extent shown below:

Sample 1:	In 2 days	6.35%
Sample 2:	In 7 days	6.33%
	In 21 additional days over H_2SO_4 a further loss of 0.82%	

Meta-alunogen was found to be sensitive to changes in humidity, and tended to pick up moisture on damp days. Dehydration studies of alunogen on heating have been made by Larsen and Steiger[2] on samples from Pinta de Canon, New Mexico. Their mineral showed first 15½ molecules of H_2O, and 12 ½ after heating (at which the mineral becomes isotropic).

PICKERINGITE

The pickeringite occurs as cross-fiber veins, as much as 10 cm. across. The mineral has a striking shrimp pink to chatenay pink color, and a typically fibrous structure.

A number of small crystals, rarely as much as a millimeter in length, were found, particularly in cavities at the junction of pickeringite and alunogen. As was the case with the alunogen, but a single crystallographic description of pickeringite has been published,[3] and in the latter the true symmetry of the crystals was not recognized.

Pickeringite crystallizes in the sphenoidal class (C_2 of Saurel) of the monoclinic system: the class in which sucrose is the best known representative, but one in which no mineral has heretofore been noted.

Crystals of pickeringite are prismatic in habit, and the prism zone is striated vertically. Terminations are often highly modified by bright smooth faces.

TABLE III. ANALYSIS OF PICKERINGITE

Francisco de Vergara, Chile

MgO	4.85
Al_2O_3	12.06
SO_3	36.46
H_2O	46 26
	99.63
Sp. gr.	1.83

Analyst: Paul Collins

REFERENCES

[1] Hlawatsch, C.: Über Alunogen von Opálbánya (Czerwenitza). Festschrift Victor Goldschmidt, Heidelberg, 1928, pp. 154-162.

[2] Larsen, Esper S. and George Steiger: Dehydration and optical studies of alunogen, nontronite, and griffithite. Am. J. Sci., (5) 15: 1-19, 1928.

[3] Bandy, Mark C.: American Mineralogist, 23: 724-727, 1938.

TABLE IV. ANGLES OF PICKERINGITE

Monoclinic (2), Sphenoidal Class

a : b · c = 0.8655 : 1 : 0.2551, β = 96°33.5′ (Bandy) [3]

p_0 = 0 2948; q_0 = 0.2534; μ = 83°26.5′; e = 0.1142.

Left			Measured Angles			*Right*				Calculated Angles	
Letter	Symbol	No.	ϕ	ρ	Letter	Symbol	No.	ϕ	ρ	ϕ	ρ
′b	$0\bar{1}0$	3	00°24′	89°56′	b	010	4	00°19′	89°54′	00°00′	90°00′
					a	100	1	88 19	90 00	90 00	90 00
′m	$1\bar{1}0$	7	49 09	89 34	m	110	7	49 12	90 00	49 18	90 00
′m	$\bar{1}\bar{1}0$	7	—49 12	89 38	m	$\bar{1}10$	8	49 26	90 00	—49 18	90 00
					*𝔤	150	1	12 13	90 00	13 06	90 00
					*𝔰	$\bar{1}40$	1	16 46	“	—16 13	“
					*𝔫	130	1	22 29	“	21 11	“
*𝔞	$\bar{1}\bar{2}0$	1	—28 45	90 00						—30 11	“
*𝔡	$3\bar{4}0$	1	40 58	“						41 06	“
					*𝔯	320	1	59 47	“	60 11	“
*′l	$7\bar{3}0$	1	68 14	“	*l	730	4	68 31	“	69 46	“
*𝔭	$3\bar{1}0$	1	74 50	“						74 00	“
*𝔥	$\bar{6}\bar{1}0$	1	—82 29	“						—81 51	“
′x	$0\bar{2}1$	1	12 19	27 45	x	021	1	12 11	27 42	12 42	27 36
′y	$0\bar{3}1$	1	8 43	37 37	y	031	2	8 08	37 35	8 33	37 44
					z	041	2	6 00	45 30	6 26	45 45
*′ψ	$0\bar{5}1$	2	4 56	51 59	*ψ	051	1	4 09	51 45	4 57	53 06
					d	101	3	89 51	22 23	90 00	22 22
					D	$\bar{1}01$	2	89 32	10 05	—90 00	10 28
					e	301	4	89 59	45 10	90 00	45 09
					E	$\bar{3}01$	1	—89 56	37 42	—90 00	37 47
					*χ	$\bar{5}01$	2	89 44	53 58	“	53 51
′p	$1\bar{1}1$	4	58 35	26 09	p	111	1	57 13	25 56	58 13	25 50
′P	$\bar{1}\bar{1}1$	5	—35 40	17 23	P	$\bar{1}11$	1	—34 56	17 33	—35 27	17 23
′f	$1\bar{2}1$	2	39 06	33 20						38 54	33 15
′F	$\bar{1}\bar{2}1$	3	—19 55	28 36	F	$\bar{1}21$	1	—19 35	28 32	—19 36	28 26
					g	131	3	28 16	40 53	28 16	40 59
′G	$\bar{1}\bar{3}1$	1	—13 06	38 08	G	$\bar{1}31$	2	12 56	37 58	13 21	38 11
*′h	$1\bar{4}1$	1	21 43	47 36	*h	141	4	21 34	47 41	22 26	47 09
′H	$\bar{1}\bar{4}1$	2	—10 00	45 59	H	$\bar{1}41$	4	—10 17	46 03	—10 06	46 01
					*o	412	1	78 40	35 59	79 47	35 45
′i	$2\bar{1}1$	2	70 18	36 52	i	211	3	70 20	36 55	70 11	36 58
′I	$\bar{2}\bar{1}1$	2	—61 38	29 15	I	$\bar{2}11$	1	—62 03	28 43	—61 56	28 28
′q	$2\bar{2}1$	3	54 33	41 05	q	221	5	54 47	40 57	54 14	41 07
′Q	$\bar{2}\bar{2}1$	2	—43 10	35 08	Q	221	1	—42 14	35 01	—43 09	34 58

Left			Measured Angles		*Right*					Calculated Angles	
Letter	Symbol	No.	ϕ	ρ	Letter	Symbol	No.	ϕ	ρ	ϕ	ρ
′j	$2\bar{3}1$	3	42°01′	46°28′	j	231	5	42°28′	46°09′	42°47′	46°12′
′J	$\bar{2}\bar{3}1$	2	—32 06	41 58	J	231	1	—31 16	42 03	—32 00	42 04
*′k	$2\bar{4}1$	2	35 12	51 25	*k	241	3	34 25	51 08	34 46	51 10
′K	$\bar{2}\bar{4}1$	2	—24 58	48 21	K	$\bar{2}41$	1	—25 08	48 30	—25 07	48 25
*′η	$\bar{2}\bar{5}1$	2	—20 29	54 35	*η	$\bar{2}51$	1	—20 47	53 41	—20 34	53 43
′r	$3\bar{1}1$	3	75 34	46 07	r	311	1	75 19	46 04	75 45	46 02
′R	$\bar{3}\bar{1}1$	2	—71 30	39 07	R	$\bar{3}11$	2	—71 47	39 09	—71 47	39 12
′t	$3\bar{2}1$	2	63 56	48 45	t	321	4	63 02	48 43	63 05	48 25
′T	$\bar{3}\bar{2}1$	2	—56 38	43 07	T	$\bar{3}21$	2	—56 37	42 54	—56 38	42 51
*′s	$3\bar{3}1$	1	53 25	51 53	*s	331	5	52 48	51 44	52 43	51 38
′S	$\bar{3}\bar{3}1$	3	—45 18	47 30	S	$\bar{3}31$	3	—45 27	47 37	—45 21	47 46
					*λ	341	1	43 52	55 05	44 34	54 44
*′Λ	$\bar{3}\bar{4}1$	4	—36 58	51 58						—37 14	52 02
					*γ	351	2	37 55	58 15	38 15	58 22
*′Γ	$\bar{3}\bar{5}1$	2	—31 12	56 13						—31 18	56 10
					*ω	361	1	32 49	61 45	33 18	61 21
*′Ω	$\bar{3}\bar{6}1$	1	—27 30	59 44						—26 52	60 29
					*ν	371	1	28 34	64 01	29 23	63 59
*′π	$4\bar{1}1$	2	79 08	53 11						78 55	53 00
*′Π	$\bar{4}\bar{1}1$	3	—76 20	47 26	*Π	$\bar{4}11$	2	—76 43	47 45	—76 37	47 47
*′v	$4\bar{2}1$	5	68 48	54 24	*v	421	5	68 26	54 23	68 36	54 26
′V	$\bar{4}\bar{2}1$	2	—64 35	49 40	V	$\bar{4}21$	4	—64 27	49 54	—64 32	49 53
*′ρ	$4\bar{3}1$	2	60 20	56 30						59 33	56 26
*′δ	$4\bar{4}1$	2	52 18	58 41	*δ	441	2	51 31	58 49	51 55	58 47
*′μ	$\bar{4}\bar{5}1$	1	—39 30	59 00						—40 03	59 02
					*ζ	471	1	35 26	65 45	36 06	65 39
*′θ	$5\bar{1}1$	1	81 56	59 38	*θ	511	1	81 09	58 27	80 56	58 18
*′Θ	$\bar{5}\bar{1}1$	3	—79 08	54 14						—79 27	54 19
					*ξ	521	1	71 45	59 16	72 18	59 13
*′Ξ	$\bar{5}\bar{2}1$	2	—69 17	55 53						—69 33	55 36
*′χ	$\bar{5}\bar{3}1$	2	—60 42	57 21						—60 48	57 28
					*σ	541	1	56 46	62 12	57 27	62 12
*′Σ	$\bar{5}\bar{4}1$	1	—53 10	59 29						—53 10	59 38
					*Υ	10.1.2	1	85 22	58 04	85 26	58 00
*′ε	$\bar{6}\bar{1}1$	1	—81 12	59 07						—81 18	59 19
					*τ	$\bar{6}41$	1	59 36	62 00	58 31	62 53
					*ι	$\bar{6}61$	1	47 10	65 00	47 25	66 09

*New forms; No. = number of faces measured.

NOTULAE NATURAE

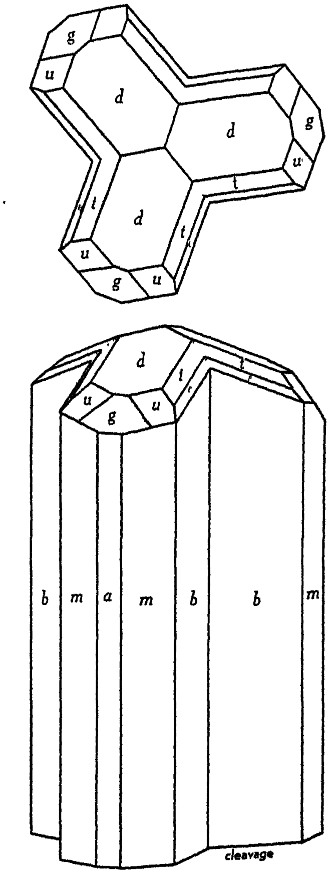
NUMBER 102 OF JULY 3, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE CRYSTALLOGRAPHY OF FIBROFERRITE

BY SAMUEL G. GORDON

Associate Curator of Mineralogy and Petrology, The Academy of Natural Sciences of Philadelphia



Fibroferrite.

Fibroferrite ($Fe_2O_3.2SO_3.10H_2O$) was so called because it is a fibrous compound of iron. It is found invariably as fibrous crusts or masses of minute acicular crystals with a tendency towards radial aggregation. Because of the minuteness of the crystals, no crystallographic data for the mineral has heretofore been recorded.

Through the kindness of Señor Tomas M. Ezcurra, Director of Mines and Geology in the Ministerio de Agricultura, a suite of sulfates was obtained from the Mina "Santa Elena", La Alcaparrosa, Department of Barreal, Province of San Juan, Argentina, which included large masses of fibroferrite. This new occurrence of fibroferrite has been described by Angelelli and Chaudet.[1] The mineral occurs in several veins, the largest—in which the new mineral sarmientite [2] was discovered—being known as the "Fibroferrite Vein"; the vein attains a thickness of 3.2 meters. Other associated minerals are copiapite, botryogen, szomolnokite, calingastite, slavikite,[3] butlerite,[3] parabutlerite,[3] gypsum, and epsomite.

Eight acicular crystals were measured on a two-circle goniometer, with the results tabulated below. These crystals were but a quarter of a millimeter long, and only a tenth of this in diameter. Most of the faces were too small to reflect distinct signals, so that it was only possible to adjust them to positions in which they seemed to reflect the most light. In spite of this, they consistently fell in symmetrical positions on the gnomonic projection, and could be thus identified. The axial ratios were calculated from the ϕ angles of the prism *m* (110), and the ρ angles of the dome *d* (101).

The habit of the crystals is prismatic, elongated in the direction of the *c* axis. Crystals are invariably twinned on *m* (110) forming triplets which are pseudo-trigonal. This is strikingly shown in the gnomonic projection, where the poles of the faces of the individual crystals fall on the same zone lines.

Fibroferrite shows a perfect basal (001) cleavage.

FIBROFERRITE: ANGLE TABLE

Orthorhombic; $a : b : c = 0.5604 : 1 : 0.2162$

$p_0 = 0.3859$; $q_0 = 0.2162$

			Average of Measured Angles		Calculated Angles	
Letter	Symbol	Faces measured	ϕ	ρ	ϕ	ρ
b	010	8	00°00′	90°00′	00°00′	90°00′
a	100	2	88 14	"	90 00	"
m	110	11	60 44	"	60 44	"
d	101	10	90 00	21 06	90 00	21 06
g	401	4	88 39	57 30	"	57 04
l	131	10	31 50	37 05	30 45	37 02
ϵ	161	8	15 31	52 51	16 34	53 22
u	532	14	70 38	45 08	71 25	45 30

REFERENCES

[1] Angelleli, Victoria and A. Chaudet: Sobre dos sulfatos de hierro de la mina "Santa Elena", provincia de San Juan. Rivista Minera Geol. y Min.; Soc. Argentina Mineria y Geol., 8: 46-52, 1937.

[2] Angellelli, Victorio and Samuel G. Gordon: Sarmientite, a new mineral from Argentina; Notulae Naturae of The Academy of Natural Sciences of Philadelphia, no. 92, 1941.

[3] Gordon, Samuel G.: Slavikite, Butlerite, and Parabutlerite from Argentina; Notulae Naturae, no. 89, 1941.

NOTULAE NATURAE

NUMBER 103 OF JULY 3, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

RESULTS OF THE CHILEAN MINERALOGICAL EXPEDITION OF 1938.* PART VIII.—THE CRYSTALLOGRAPHY OF FERRINATRITE

BY SAMUEL G. GORDON

Associate Curator of Mineralogy and Petrology, The Academy of Natural Sciences of Philadelphia

Excepting for its occurrence in encrustations about fumaroles at Vesuvius [1], ferrinatrite is known only from a few localities in the Atacama Desert of Chile: the Mina La Compania, south of Sierra Gorda (probably the type locality); Alcaparossa at Cerritos Bayos,—north of Sierra Gorda; the copper mine at Chuquicamata, [8] and the Mina Salvadora near Quetena. If, as seems probable, leucoglaucite [2] is identical with ferrinatrite, a sixth locality would be Tierra Amarilla, near Copiapó.

Ferrinatrite was described in 1890 by Mackintosh [3] as " ferronatrite " and by Frenzel [4] as " gordaite "; the more correct name was suggested by Scharizer [5] who investigated the artificial salt. Genth and Penfield [6] analyzed specimens collected by Professor Henry A. Ward at the Mina La Compania. The single crystallographic work was by Arzruni [7] based on Frenzel's material which had been collected by Th. Hohmann. The crystals were not figured.

Crystals examined by the writer included material collected at the Mina La Compania, Alcaparrosa, and Quetena (Mina Salvadora).

The ferrinatrite occurs at the Mina La Compania in prismatic crystals as large as 1 cm. in length, and 4 mm. thick. Cleavage aggregates of crystals resemble tremolite in appearance, since the mineral has a perfect prismatic (M, $11\bar{2}0$) cleavage. Associated with the ferrinatrite, and emplanted upon it in cavities are brown hexagonal crystals of metavoltine; yellow, transparent minute crystals of copiapite, and purple prismatic crystals of coquimbite. Other minerals occurring in the vein include colorless tamarugite, orange sideronatrite, yellowish anhydrite, and buff-colored pulverulent szomolnokite.

---

* This expedition was made possible by the generosity of Mr. Charles M. B. Cadwalader, President of the Academy of Natural Sciences of Philadelphia, and a grant-in-aid from the Eldredge Reeves Johnson Fund of the American Philosophical Society. Parts I–VII appeared as Notulae Naturae Nos. 57, 64, 69, 72, 80, 97, and 101.

Fibroferrite occurs at Alcaparrosa as large (30 cm. or more) white, cryptocrystalline aggregates (analysis by William Pitman in Table I).

TABLE I. ANALYSIS OF FERRINATRITE

Alcaparrosa, Cerritos Bayos, Chile

	Analysis by William Pitman	Theory for $3Na_2O\,Fe_2O_3.6SO_3\,6H_2O$
Fe_2O_3	17.47	17.1
Na_2O	20.03	19.9
K_2O	0.39	
SO_3	51.00	51.4
H_2O	11.62	11.6
	100.51	100.0

Cavities in these porcelain-like masses contain nests of orange sideronatrite with some yellow copiapite, and small crystals of fibroferrite and tamarugite.

Fibroferrite occurs at the Mina Salvadora near Quetena, in colorless prismatic crystals, with tamarugite, associated with orange sideronatrite.

The habit of the crystals, and relative development of forms observed are shown in Figures 1 to 3. The axial ratio was calculated from the average angles of 16 faces of the forms r $(01\bar{1}1)$ and R $(10\bar{1}1)$:

$$\rho = 32°43', \quad c = 0.5563$$

Optical properties.—Crystals of ferrinatrite are colorless and transparent, but aggregates are white. The indices of refraction of the mineral were determined by the immersion method upon crystals from the Mina La Compania, the Mina Quetena, and from Alcaparossa. The indices of refraction of the liquids used were immediately measured on a Spencer-Abbe refractometer, the accuracy of which was checked by means of the glass prism furnished by the manufacturer. The results were identical for all three localities, and close to the values recorded by Genth and Penfield[6] determined upon a prism cut with its edge parallel to the vertical axis, using yellow (Na) light:

		Genth and Penfield[6]
Optically +, ω	1.557	1.558
ϵ	1.611	1.613

Table II. Angles of Ferrinatrite

Hexagonal-scalenohedral $\left(\bar{3}\,\frac{2}{m}\right)$

$$c = \frac{p_0}{2}\sqrt{3} = 0.5563$$

$$p_0 = \tan\rho\ (10\bar{1}1) = 0.6425$$

Letter	Symbol	La Compania		Alcaparossa		Quetena		Calculated Angles		Leucoglaucite
		ϕ	ρ	ϕ	ρ	ϕ	ρ	ϕ	ρ	ρ
c	0001	00°00′	00°00′					00°00′	00°00′	00°00′
m	$10\bar{1}0$	29 38	90 00	29°42′	90°00′	29°44′	90°00′	30 00	90 00	90 00
M	$11\bar{2}0$	00 13	"	00 08	"	00 17	"	00 00	90 00	90 00
R	$10\bar{1}1$	29 50	32 33	29 50	32 47	29 57	32 43	30 00	32 43	32 50
s	$10\bar{1}2$	29 54	17 38	29 35	18 08	29 59	17 47	30 00	17 48	17 53
r	$01\bar{1}1$	—29 51	32 43	—29 53	32 46	—29 58	32 44	—30 00	32 43	32 50
u *	$11\bar{2}1$	00 10	48 07	00 04	48 22	00 03	48 06	00 00	48 03	48 10
v *	$21\bar{3}1$			10 59	59 22	11 21	58 16	10 54	59 32	59 39

* New forms.

Specific gravity.—The specific gravity was kindly determined by Miss Judith Weiss upon crystals from the Mina La Compania, using the sink and float method with benzol and bromoform, and weighing the matching liquid in a pycnometer. The value obtained was

Sp. gr. = 2.562 at 24°C.

References

[1] Washington, H. W. and Arthur L. Day: Bull. Geol. Soc America, 26: 380, 1915. Zambonini, F.: Boll. Comit. Geol. Ital., 48 (3): 25, 1920-1921. Boll. Soc. Geol. Ital., 49: 199, 1930

[2] Ungemach, H.: Bull. Soc. Franc Min., 58: 203-209, 1935.

[3] Mackintosh, James B.: Am. J. Sci., (3) 38: 244, 1889.

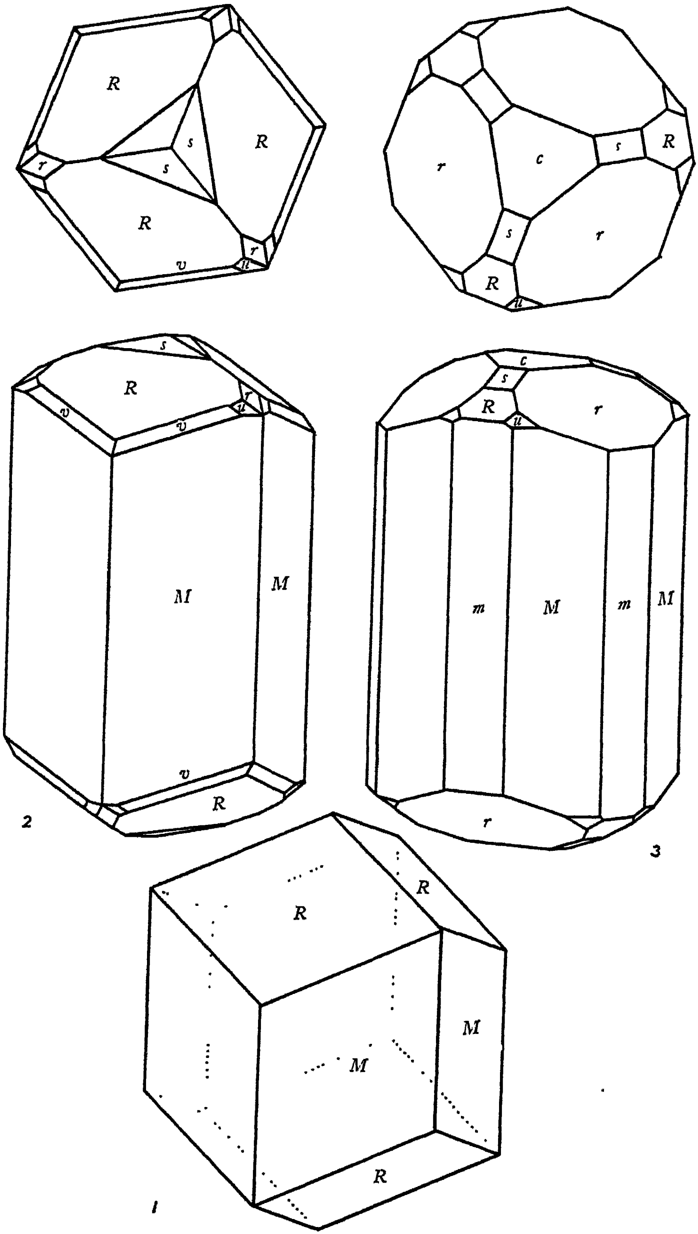
[4] Frenzel, A.: Min. u. Petr. Mitth., 11: 218-220, 1890.

[5] Scharizer, R.: Zeits. f. Kryst., 41: 224, 1906.

[6] Genth, F. A. and S. L Penfield: Am. J. Sci. (3) 40: 202-203, 1890.

[7] Arzruni, A. and A. Frenzel: Zeits. f. Kryst., 18: 595-598, 1891.

[8] Bandy, Mark C.: American Mineralogist, 23: 731-733, 1938.



Fibroferrite crystals: 1, 3: Mina La Compania; 2: Alcaparrosa.

NOTULAE NATURAE

NUMBER 104 OF JULY 3, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW SPECIES OF FROG (ELEUTHERODACTYLUS) FROM COSTA RICA

BY EMMETT REID DUNN

Curator of Reptiles and Amphibians, The Academy of Natural Sciences of Philadelphia

On the night of June 7, 1936, after heavy rain, Mrs. Dunn, the late Ferdinand Nevermann, and myself went out collecting from the finca of Felix Delgado, at an altitude of about 4000 feet, halfway between the La Palma divide and the La Hondura Bridge. There was a tremendous chorus of many species of frogs, and we collected a great many specimens. Of these, one is a representative of an otherwise unknown and quite distinct form. I name it, in honor of my helpmate,

Eleutherodactylus altae new species

TYPE.—A.N.S.P. 23815.

Type locality.—Atlantic slope of Costa Rica, on the pass between Barba and Irazu, below the divide and above the finca of Felix Delgado, approximately 4000 feet.

Range.—Known only from type locality.

Diagnosis.—Comparable only with *E. diastema;* agreeing with it in short feet, big digital disks, pectoral vocal pouch, and size; differing from it in longer legs, more rugose belly, less developed supratympanic fold, coral red stripes on side and front surface of thigh.

Description. — A.N.S.P. 23815, adult male; snout short, blunt, high, slightly longer than orbit; canthus rostralis obtuse; upper eyelid less wide than interorbital space; tympanum indefinite, approximately ½ orbit; skin smooth above, very rugose on whole lower surface; a fold from axilla to axilla marking posterior boundary of vocal pouch; heel reaches eye; appressed heels touch; finger 1 shorter than finger 2; finger digits large, except for first finger; disc on finger 3 larger than tympanum; toes without web; toes 3 and 5 as long as shin; toe 4 a little longer than knee; disc of toe 4 = disc of finger 3; tongue oval, slightly nicked behind; vomerine teeth two on each side, in and back from choanae; dark gray above, light gray below;

a coral red stripe from middle of side to groin; a coral red stripe on anterior face of thigh (these red stripes faded to white in preservative) a white spot on hind side of each thigh; two white spots on hind side of left shin and three on right; total length 21 mm.

Remarks —The note of this male was not distinguished in the general din.

Its only ally among Costa Rican frogs is *Eleutherodactylus diastema* which was taken at the same place and time. *E. diastema* was described as a *Lithodytes* by Cope in 1875 on the basis of two specimens taken by Bransford in Panamá. The locality given is "Camp Mary Caretta", but MS label has been found reading "Camp Margharetta." The other localities mentioned are all in the Canal Zone and it is probable that Margarita, near Colon, was intended.

There are two cotypes, U.S.N.M 25170 and 25171. I designate the former as the type of *diastema*, an action which is necessary because the latter is a specimen of *Eleutherodactylus ockendeni* (Boulenger). Cope's name and description more nearly apply to the former specimen.

E. diastema has a wide range for so small a frog, and has been described a number of times. The following list of names I consider to be synonyms of *diastema*. I have examined all the types.

Phyllobates hylaeformis Cope 1875 from Costa Rica.
Hylodes gularis Boulenger 1898 from western Ecuador.
Hyloxalus huigrae Fowler 1913 from western Ecuador.
Hyla chica Noble 1918 from eastern Nicaragua.
Syrrhophus ineptus Barbour 1928 from the Canal Zone.

NOTULAE NATURAE

NUMBER 105 OF JULY 7, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NEW BIRDS FROM BOLIVIA.* PART V

BY JAMES BOND AND RODOLPHE MEYER DE SCHAUENSEE

Department of Birds, The Academy of Natural Sciences of Philadelphia

While continuing our study of the Academy's Bolivian collections, formed chiefly by M. A. Carriker, Jr., we find that the following birds require description.

Picumnus cirratus thamnophiloides new subspecies

TYPE—ad. ♂, A.N.S.P. no. 143382, collected at Bermejo, Rio Bermejo (1350 ft.), Dept. of Tarija, Bolivia, September 8, 1936, by M. A. Carriker, Jr.

Description.—Resembles *P. c. d'orbignyanus* Lafresnaye of northern Bolivia, but under parts much more heavily marked; abdomen and flanks regularly barred with black; markings on chest somewhat broken, more or less tending toward bars. In "*pilcomayensis*" Hargitt, the barring of the under parts is regular throughout, and the abdomen is not strongly washed with buff as in *thamnophiloides* and *d'orbignyanus*.

Measurements of type.—Wing 53.5, tail 32, tarsus 15, culmen 11.25 mm.

Range.—Southern Bolivia (Department of Tarija, except in the foothills in the region about Villa Montes) and northwestern Argentina (Jujuy and Salta).

Specimens examined.—*P. c. jelskii* 3 ♂, ♀ from Eneñas, Junin, Peru. *P. c. d'orbignyanus* 4 ♂, 7 ♀ from Inquisivi, Dept. La Paz (= ♀ type); Ele-Ele, Dept. Cochabamba; Samaipata, Dept. Santa Cruz and from the Rio Azero, Dept. Chuquisaca. *P. c thamnophiloides* 10 ♂, 7 ♀ from Bermejo, Entre Rios, Rio Lipeo and La Merced, Dept. Tarija; ♂, 2 ♀ from Perico, and from the Rio San Francisco, Jujuy, Argentina*; ♂ from Quebrada Escaipe, Salta, Argentina*. *P. c.* subsp. 3 ♂, ♀ from Villa Montes,

---

* Previous parts in this series appeared in Notulae Naturae as follows: Part I, no 12; Part II, no. 29; Part III, no. 44; Part IV, no 93.

The ornithological field investigations on which these studies are based were supported jointly by Mr Charles M B Cadwalader, President of the Academy, and a grant-in-aid from the Penrose Fund of the American Philosophical Society in 1934; in part by the Penrose Fund in 1936; and in 1937 were made possible by the generosity of Mr Cadwalader

* Specimens in the collection of the American Museum of Natural History

Dept. Tarija (A.N.S.P. collection); 4 ♂, ♀ from Puerto Pinasco, Paraguay, and from Formosa, Argentina (U.S.N.M. collection). "*P. c. pilcomayensis*" and *P. c. cirratus*,—extensive series of both forms examined*.

Remarks.—This new race connects *d'orbignyanus* of northern and central Bolivia with the bird from Argentina which is regularly barred with black on the entire under parts and which thus agrees with the description of *pilcomayensis*. Examples from Villa Montes (Dept. Tarija) on the upper Pilcomayo, in addition to specimens taken by Wetmore at Puerto Pinasco, Paraguay, and at Formosa, Argentina, constitute a third race characterized by immaculate white throat and broken barring on the chest (cf. Wetmore, U. S. Nat. Mus., Bull. 133, 1926, pp. 210-211). It is likely that the type of *pilcomayensis*, a specimen without data, was taken on the Rio Parana, not on the Rio Pilcomayo. In any case it should be examined and if it proves to be the form with regularly barred under parts, the more northern white-throated birds will require a name.

Specimens in the American Museum of Natural History from Tucumán (= "*tucumanus*" Hartert and Venturi) have been examined and are considered identical with the regularly barred variety, of which we have seen specimens from the Rio Parana.

Cyclarhis gujanensis tarijae new subspecies

TYPE.—♂ ad., A.N.S.P. no. 133853, collected at the Rio Lipeo (2100 ft.), Dept. of Tarija, Bolivia, August 21, 1936, by M. A. Carriker, Jr.

Description.—Nearest to *C. g. viridis* (Vieillot) but much brighter, golden green rather than warbler-green above; yellow of throat brighter and richer, and much more extensive, continuing down the sides to the flanks in most specimens. Size smaller.

This new form differs strikingly from *C. g. dorsalis* Zimmer which has the back grayish green, even in fresh plumage, and the under parts of that race are more as in *viridis*.

Measurements of type.—Wing 79, tail 67, culmen 16.5 mm.

Range.—The Department of Tarija, Bolivia southward into Jujuy (Rio San Francisco), Argentina.

Specimens examined.—*C. g. tarijae*, 6 ♂, 4 ♀, from Villa Montes, Bermejo, Rio Lipeo, Fortin Campero, La Merced (Dept. of Tarija, Bolivia); ♂, ♀, from Rio San Francisco, Prov. of Jujuy, Argentina (specimens in collection of American Museum of Natural History).

C. g. viridis, 28 ♂, 14 ♀, from Corrientes, Santiago del Estero, Salta, Gob. del Chaco, La Soledad, Ocampo, Mocovi, Tucumán, Mendoza, (Argentina); Prov. del Sara and Samaipata in the Department of Santa Cruz (Bolivia); Fort Wheeler, Trinidad (Paraguay).

C. g. dorsalis, 17 ♂, 6 ♀, from the Departments of Cochabamba, Santa Cruz and Chuquisaca (Bolivia).

Cyclarhis gujanensis pax new subspecies

TYPE.—♀ adult, A.N.S.P. no. 119581, collected at Sandillani (6800 ft.), Yungas of La Paz, Bolivia, December 10, 1934, by M. A. Carriker, Jr.

Description.—Resembles *C. g. tarijae*, but bill rather shorter and less heavy; posterior under parts white, not washed with ochraceous-buff; yellow of throat somewhat greener and not extended down the sides of the breast. Resembles also *C. g. gujanensis* (Gmelin) but lower throat and chest are less green. Size larger.

Measurements of type.—Wing 85, tail 64, culmen 15 mm.

Range.—Known from a single specimen from the type locality.

Remarks.—We have examined 101 specimens of *C. g. gujanensis* (Gmelin), and 9 specimens of *C. g. cearensis* Baird, and all of these 110 examples have wings under 80 mm. Five birds from Huanay (1500 ft.) Rio Mapiri, Dept. of La Paz (= *C. g albiventris* Carriker, not *Cyclorhis albiventris* Sclater and Salvin) are clearly intermediate both in size and color between *pax* and *gujanensis*. The wings measure 74-79.5 mm. We refer these as well as one from Santa Ana (2200 ft.), Rio Coroico, La Paz (wing 78 mm.) to *gujanensis* as has already been done by Zimmer (Amer. Mus. Novit. no. 1160, 1942, p. 15), although they are by no means typical of that form.

In addition to the races mentioned above we have compared *pax* with good series of the Peruvian races of this species.

Tanagra mesochrysa yungae new subspecies

TYPE.—♂ ad., A.N.S.P. no. 133614, collected at Palmar (2600 ft.), Yungas of Cochabamba, Bolivia, July 21, 1937, by M. A. Carriker, Jr.

Description.—Male differs from *Tanagra mesochrysa tavarae* Chapman, from the Subtropical Zone of eastern Peru, by having the forehead clear orange-yellow, instead of lemon-yellow speckled with dark olive, this yellow area slightly more extensive posteriorly; breast and under tail-coverts darker, more ochraceous. A female is very like that of *tavarae* but the throat in series is possibly a trifle brighter, more yellowish. Size similar.

Measurements of type.—Wing 60, tail 31.5, exposed culmen 8 mm.

Range.—Known only from the Yungas of Cochabamba, Bolivia.

Material examined.—*Tanagra mesochrysa yungae*, 4 ♂, 4 ♀, including specimens in the American Museum of Natural History from the Yungas of Cochabamba; *Tanagra mesochrysa tavarae,* 3 ♂, 3 ♀, from Eneñas, Dept. of Junin; La Pampa, Dept. of Sandia; Rio Jelashte, Dept. of San Martin; also a female from Chaupé, Peru, in the collection of the American Museum of Natural History.

We are obliged to Dr. John T. Zimmer of the American Museum of Natural History for allowing us the use of the necessary comparative material.

NOTULAE NATURAE

NUMBER 106 OF AUGUST 26, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW FLORIDAN CALLIOSTOMA (ASTELE)

BY JEANNE S. SCHWENGEL

Research Associate, Department of Mollusks, The Academy of Natural Sciences of Philadelphia

Among the many interesting shells dredged by Thomas L. McGinty near Destin, N. W. Florida, in October 1941, is a new *Calliostoma,* subgenus *Astele.* As it does not seem closely related to *Astele* s.s., the sculpture pattern being quite different, it seems proper to make this new species, *Calliostoma (Astele) agalma,* the type of a new section of *Astele,* to be called *Dymares,* for amply umbilicate species having nearly smooth spirals in the peripheral region, and few granulose spirals with striate intervals above them.

Calliostoma (Astele) agalma new species

Shell low-conic, apex acute, outlines of spire concave near the apex, elsewhere straight, whorls flat, deeply umbilicate, the umbilicus contained about five and one-third times in the diameter. Surface granular; color, broad red-brown maculations evenly alternating with narrower, straw-colored flammules.

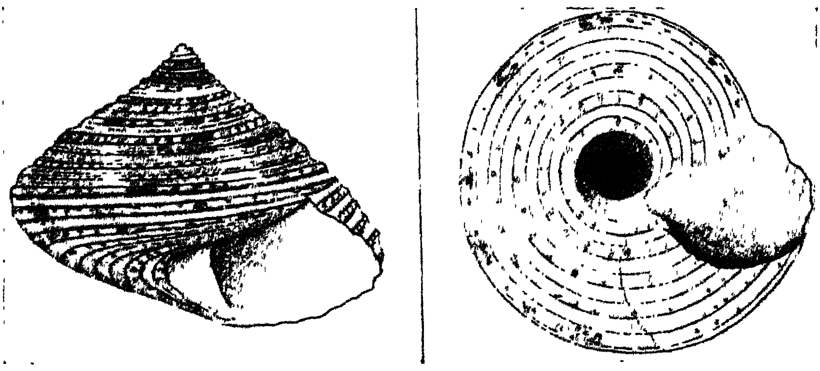


FIG. 1.—*Calliostoma agalma* new species.

Periphery rounded, base weakly convex. It has seven whorls, the first nuclear whorl minute, white, smooth and well-rounded, the second, straw-colored, with two spiral cords and very fine axial threads, the third, maculated with red, has three spirals, faintly beaded, the third, forming a low supra-sutural keel, much heavier than the other two. The axial threads continue, becoming more oblique. On the fourth whorl, a finely beaded spiral commences between each of the three previous spirals, which grow progressively stronger. The fifth whorl has a heavily beaded first spiral, three smaller beaded spirals, with finer, faintly beaded spirals between, and the last spiral becomes a smooth, rounded cord, irregularly spotted with short and long reddish-brown dots. From there on the fine spiral threads increase between the beaded spirals, which become farther apart with the enlarging whorls. The beads elongate and are more or less regularly spotted with reddish-brown. On the sixth and seventh whorls the intercalary threads increase to three, and in places become slightly beaded.

The sutures are rather deep, in a right-angled excavation between the whorls, with one to three faintly beaded spirals. The body whorl has another heavier, smooth cord at the periphery, with widely spaced reddish-brown spots. These two smooth cords are separated by five fine spiral threads. The base is flatly-rounded, with ten flattened spirals, every other one spotted with reddish-brown, the spots becoming closer and darker toward the umbilicus, and the last four spirals becoming heavily beaded The umbilicus is margined by a heavy cord which spirals to the apex.

The last whorl and base are covered with faint, oblique incremental lines. The aperture is white and iridescent within, with a short, arcuate columella, slightly calloused. The operculum is round, paper-thin and corneous.

Height 7 mm., Max. diameter 9.5 mm.

TYPE.—No. 178758 A.N.S.P., dredged off Destin, N. W. Florida, in 18 to 20 fathoms, by T. L. McGinty.

This species has a relatively ample, well-like umbilicus, like typical *Astele*, not funnel-shaped as in the American species referred to *Leiotrochus* (*Eutrochus*), such as *zonamestum* and *jujubinum*.

NOTULAE NATURAE

NUMBER 107 OF SEPTEMBER 16, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTIONS OF SIX NEW FRESH-WATER FISHES (CYPRINIDAE AND PERCIDAE) FROM THE SOUTHEASTERN UNITED STATES

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

The new fishes described below were all obtained during the past few years from several sources. The types are all in the collection of the Academy and form but a very small part of extensive lots of specimens received from our various field expeditions and correspondents.

Collection of material, in part, was made possible through a grant-in-aid from the Eldridge Reeves Johnson Fund by the American Philosophical Society.

CYPRINIDAE

NOTROPIS Rafinesque

Subgenus HUDSONIUS Girard

Notrop's petersoni new species Figures 1 (predorsal view) and 2

Depth 4⅓; head 3½, width 2. Snout (in profile) 4⅛ in head measured from snout tip, latter level with lower edge of pupil; eye 3⅗, greater than snout, 1⅓ in interorbital; maxillary reaches below eye for ⅛ its diameter, length 3⅖ in head measured from snout tip; mouth little inclined from horizontal, cleft rather large, lower jaw slightly protruded as closed; interorbital 3⅖, low, convex; suborbitals narrow, only cover ¼ of cheek as measured to preopercle ridge; notch or depression at subopercle and interopercle articulation below angle of preopercle. Gill opening extends forward not quite opposite hind eye edge. Gill rakers 4+6 short feeble or rudimentary points. Right pharyngeal teeth 4, 2, compressed, ends hooked, larger with entire grinding surfaces.

Scales 36+3 in lateral line; 5 above to dorsal origin, 3 below to ventral origin, 4 below to anal origin; 17 predorsal. Caudal base scaly. Chest, breast and prepectoral naked. Lateral line complete, little decurved anteriorly.

D. II, 7, first branched ray 1¼ in total head length; A. I, 7, first branched ray 1⅘; least depth of caudal peduncle 2⅞; caudal 1¼, deeply emarginate behind; pectoral 1½, rays I, 12; ventral rays I, 7, fin 1¾ in head.

Color when fresh in alcohol with back light greenish olive, edge of each scale narrowly dark brown or dark gray. Black lateral band with blue and violaceous tinge, less than eye in width, only slightly reflected as narrow dark edge of lower jaw forward, ends in black spot size of pupil at caudal base; each tube in lateral line in black spot. Median dark lines 3 on predorsal region. Black streak, made up of blackish dots, along anal base. Dorsal, anal and caudal grayish, last with front edges white. Caudal orange basally, yellowish behind black basal spot. Paired fins pale to whitish, upper pectoral edge dusky. Iris silvery white, except as crossed by dark lateral band. Under surface of body white.

A. N. S. P. no. 69967. Crane Creek on U. S. #1 below bridge, Moore County, North Carolina. August 23, 1940. " Clear pine water, gently flowing and bottom sandy." Length 62 mm. Type.

A. N. S. P. no. 69968. Haw River in basin of the Cape Fear River, on route U. S. #1 at bridge. Chatham County, North Carolina. August 25, 1940. "Water muddy, also bottom." Length 62 mm. Paratype. This shows:

Depth $4\frac{3}{5}$; head $3\frac{7}{8}$, width 2. Snout $3\frac{1}{2}$ in head from snout tip; eye $3\frac{1}{5}$, slightly greater than interorbital; maxillary 3 in head measured from snout tip; jaws even when closed; interorbital $3\frac{1}{5}$. Scales 34+2 in lateral line; 15 predorsal scales. D. II, 7; A. II, 6. Color pale, evidently faded, though traces of similar pattern to that of type still remain and coloration all more silvery white. This specimen varies from the type in having shorter ventrals, which when depressed do not reach vent. The predorsal scales are regular. The depression below the preopercle angle is not distinct as in the type. The origin of the anal is less advanced below the hind part of the dorsal as depressed.

Associated with the type were small *Dorosoma cepedianum* (Le Sueur), *Gambusia holbrookii* (Girard), *Notropis chalybaeus* (Cope), *Semotilus atromaculatus thoreauianus* Jordan, *Fundulus rathbuni* Jordan and Meek, and *Lepomis auritus solis* (Valenciennes).

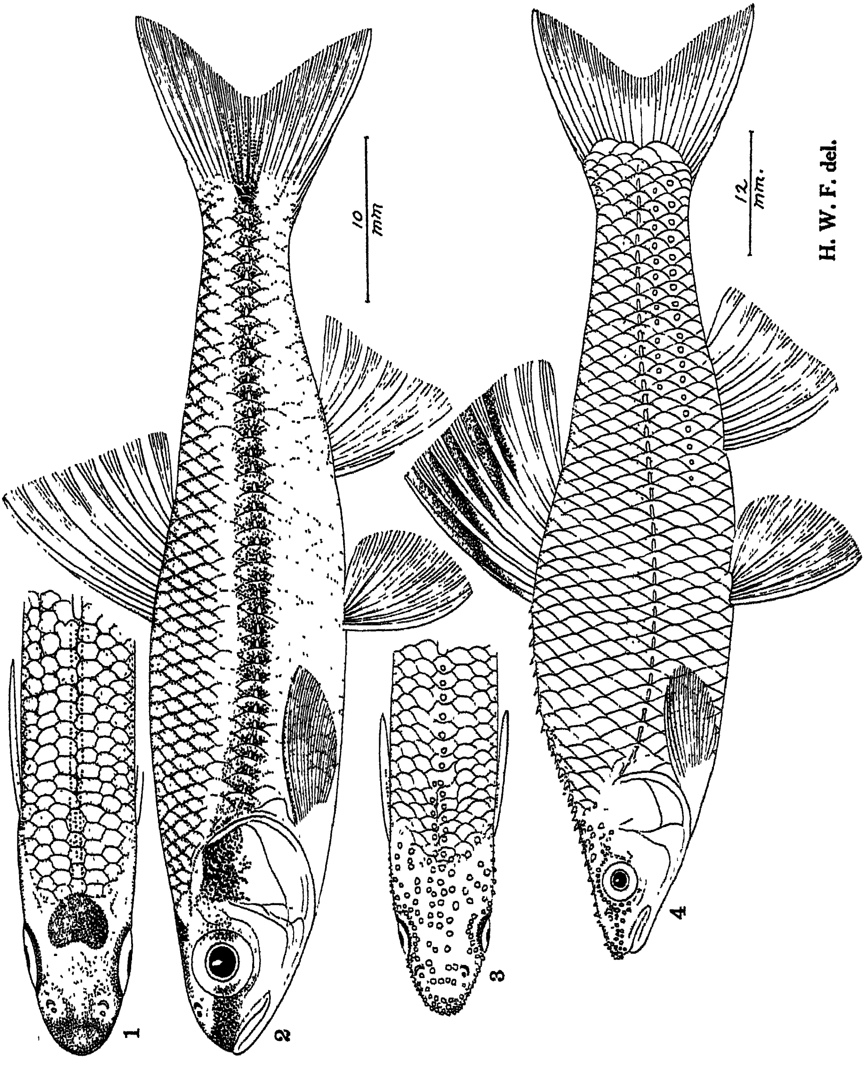
Differs from *Notropis saludanus* (Jordan and Brayton) in its terminal higher mouth, coloration, proportions and fin rays. Proposed common name, Peterson's Shiner.

(Named for Mr. C. Bernard Peterson, who with Messrs. G. A. Coventry and F. A. Ulmer, Jr., collected the types.)

Subgenus MONIANA Jordan

Notropis leedsi new species Figures 3 (predorsal view) and 4

Depth $3\frac{7}{8}$; head $4\frac{1}{4}$, width $1\frac{4}{5}$. Snout $3\frac{1}{4}$ in head, snout tip level with eye center; eye 5, $1\frac{1}{2}$ in snout, 2 in interorbital; maxillary reaches opposite front eye edge, length $3\frac{1}{2}$ in head; mouth rather large, low and little inclined,



Figs. 1, 2.—*Notropis petersoni* new species. Figs. 3, 4.—*Notropis leedsi* new species.

lower jaw shorter as closed; interorbital $2\frac{3}{5}$ in head, low, convex; suborbitals narrow, little encroaching on cheek. Gill opening extends forward opposite vertical limb of preopercle. Gill rakers 2+2, short weak points. Right pharyngeal teeth 4, 0, compressed, hooked, with broad entire grinding surfaces.

Scales 36+2 in lateral line, which is little decurved in front; 7 above to dorsal origin, 3 below to ventral origin, 4 below to anal origin; 14 predorsal. Caudal base scaly. Chest, breast and prepectoral region naked. Pearl organs partly biserial from occiput back, then uniserial to dorsal, all directed forward; rather sparsely scattered over top of head, smaller on end of snout and preorbital, and close set row of small ones over each eye; 2 rows parallel along lower side of tail.

D. II, 7, first branched ray $1\frac{1}{10}$ in head; A. II, 7, first branched ray $1\frac{1}{2}$; least depth of caudal peduncle 2; caudal $3\frac{3}{4}$ in rest of fish, well emarginate behind; pectoral I, 12, fin $1\frac{1}{2}$ in head; ventral $1\frac{1}{4}$, rays I, 7.

Color when fresh in alcohol pale blue-gray, lighter to whitish below. Along middle of side of body, one scale wide, gray lateral band. Iris whitish. Fins all largely pale to whitish, except dorsal which has upper anterior half gray to blackish gray.

A. N. S. P. no. 69969. Ohoopee River about $2\frac{1}{2}$ miles north of Oak Park. Emanuel County, Georgia. May 1, 1933. Dr. Francis Harper. Length 96 mm. Type.

A species distinct in its coloration and arrangement of the pearl organs, the large dorsal fin inserted slightly behind the ventral insertions and with a large upper anterior dark to blackish area. It approaches *Notropis callisema* (Jordan), from the Ocmulgee, differing chiefly as detailed above. Its dorsal is similarly high and the general color clear dark blue above, sides and below silvery white. A blue-gray lateral streak separates the color of the back and belly and the dorsal has no black spot posteriorly. Associated with the type were 3 specimens of *Lepomis auritus solis*. Proposed common name, Leeds's Shiner.

(Named for the late Arthur N. Leeds of Philadelphia, who had been much attracted by the charm of the Ohoopee and who was present on the occasion when the type specimen was collected.)

Subgenus HYDROPHLOX Jordan and Brayton

Notropis burchi new species Figures 5 (predorsal view) and 6

Depth $5\frac{5}{6}$ to $6\frac{1}{8}$; head $4\frac{1}{5}$ to $4\frac{1}{3}$, width $1\frac{7}{8}$ to 2. Snout (in profile) 4 to $5\frac{1}{8}$ in head, snout tip level with lower pupil edge; eye $3\frac{1}{4}$, greater than snout, $1\frac{1}{8}$ to $1\frac{1}{4}$ in interorbital; maxillary reaches $\frac{4}{5}$ to eye, length $4\frac{1}{5}$ to 5 in head; mouth small, low, mandible little included, closed jaws even; interorbital $2\frac{2}{3}$ to $3\frac{1}{8}$, low, broadly convex; suborbitals narrow, invade $\frac{2}{5}$ of cheek as measured to preopercle ridge. Gill opening extends forward opposite hind edge of postorbital bone. Gill rakers $1+8$, low feeble rudimentary points. Right pharyngeal teeth 4, 2, small, hooked, compressed, largest with narrow grinding surfaces.

Scales 34 or $35+2$ or 3 in lateral line; 5 above to dorsal origin, 3 below to ventral origin, 4 below to anal origin; 15 predorsal. Caudal base scaly. Small scales on prepectoral region, chest and breast. Lateral line complete, little decurved anteriorly.

D. III, 7, first branched ray $1\frac{1}{8}$ to $1\frac{1}{6}$ in head; A. III, 7, first branched ray $1\frac{1}{3}$ to $1\frac{2}{5}$; least depth of caudal peduncle $3\frac{1}{8}$ to $3\frac{1}{4}$; caudal $3\frac{1}{2}$ to $4\frac{3}{4}$ in rest of fish, fin well emarginate behind; pectoral $1\frac{2}{5}$ in head, rays I, 12; ventral rays I, 7, fin $1\frac{2}{5}$ to $1\frac{3}{5}$ in head.

Color in life or when freshly caught " head orange-brown, with greenish reflections. Opercle silvery with bluish tints. Head and sides silvery blue. Belly dirty white. Caudal silvery with round basal black spot. Iris pale lilac. Dorsal, pectoral, belly, and anal fins silvery." Color in alcohol with a blackish lateral band on the head, not involving the mandible or chin and continued back to caudal base where forming black caudal spot. End of snout and base of caudal flushed orange-red.

A. N. S. P. no 69970. Mill Creek, tributary of St. Mary's River, eastern Charlton County, Georgia. December 14, 1940. John W. Burch. Length 60 mm. Type.

A. N. S. P. no. 69971. Same data as type. Length 61 mm. Paratype.

Mr. Frederick V. Hebard, who also furnished the above quoted life colors for this species, wrote as follows: " The day was cloudy, warm and still. The drought persisting for over three months had dried up all runs and branches, and parts of some creeks. Muddy water two feet deep was found, about 100 yards west of the Camden County line, in the culvert under Georgia #40, built to carry the headwaters of Mill Creek here, about four miles by its course from its mouth in the St. Mary's. No water was in the creek bed on either side of the road. Stirring the water at one end and seining at the other end of the culvert produced but two warmouth perch (*Chaenobryttus coronarius*). Consequently Burch ducked under the culvert to the middle and emerged with a seine full of about 75 butter cats (*Ameiurus natalis*) and four warmouth perch. Two additional drags in the same fashion made a total yield for the culvert of about 100 butter cats, ten warmouth perch, two suckers (*Erimyzon sucetta*), two gar pikes (*Lepisosteus platostomus*), one gizzard shad (*Dorosoma cepedianum*) and one pike (*Esox americanus*). A sail fish (*Mollinesia latipinna*) was missed. We then moved west about a mile to the culvert over Green Head but found it dry with dead bottom minnows (*Notropis burchi*) not yet scavenged by the vultures."

Notropis burchi differs from *N. chalybaeus* (Cope), *N. chiliticus* (Cope), etc., and the species usually arranged in the subgenus *Hydrophlox*, chiefly in its more slender body, structural characters and coloration. Proposed common name, Burch's Shiner.

(Named for Mr. John W. Burch, of Folkston, Georgia, who collected the types.)

Subgenus COCCOTIS Jordan

Notropis waccamanus new species Figures 7 (predorsal view) and 8

Depth $4\frac{1}{5}$ to $5\frac{1}{3}$; head 4 to $4\frac{1}{2}$, width $1\frac{1}{5}$ to $1\frac{7}{8}$. Snout (in profile) $3\frac{7}{8}$ to 4 in head, end level with lower pupil edge; eye $2\frac{1}{5}$ to $3\frac{1}{4}$, greater than snout, subequal with interorbital in young to $1\frac{1}{8}$ in interorbital with age; maxillary reaches below front eye edge to $\frac{1}{4}$ its diameter, length $2\frac{3}{4}$ to 3 in head; mouth low, little inclined from horizontal, lower jaw very slightly shorter or included in upper; interorbital $2\frac{3}{4}$ to $2\frac{1}{5}$, low, broadly convex; suborbitals very narrow, invade only $\frac{1}{4}$ of cheek measured to preopercle ridge. Gill opening extends forward opposite hind edge of postorbital bone. Gill rakers 1+5, short rudimentary feeble points. Pharyngeal teeth 1, 4+4, 2, hooked, compressed, larger with well developed, smooth or entire grinding surfaces.

Scales 33 or 34+2 in lateral line; 5 above to dorsal origin, 3 below to ventral origin, 4 below to anal origin; 15 predorsal. Body scales narrowly imbricated, extend on caudal base. Small scales on chest, breast and prepectoral region. Lateral line completed, slightly decurved anteriorly.

D. II, 7, first branched ray $1\frac{1}{8}$ to $1\frac{1}{4}$ in head; A. II, 6 or III, 7, first branched ray $1\frac{2}{3}$ to $1\frac{3}{4}$; least depth of caudal peduncle $2\frac{3}{5}$ to $2\frac{3}{4}$; caudal $3\frac{7}{8}$ to 4 in rest of fish, well emarginate behind; pectoral $1\frac{1}{3}$ to $1\frac{2}{3}$ in head, rays I, 10; ventral rays I, 7, fin $1\frac{1}{2}$ to $1\frac{3}{4}$ in head.

Color in alcohol brown on back and head above, edge of each scale narrowly dark. Black lateral band on head, through eye, and leaden grayish along side of trunk, narrowing posteriorly on tail, to end in small round black spot less than pupil at middle of caudal base, membrane between each ray narrowly blackish. Band of dark to black dots on body along anal base and medially on lower edge of caudal peduncle. Fins otherwise pale to whitish.

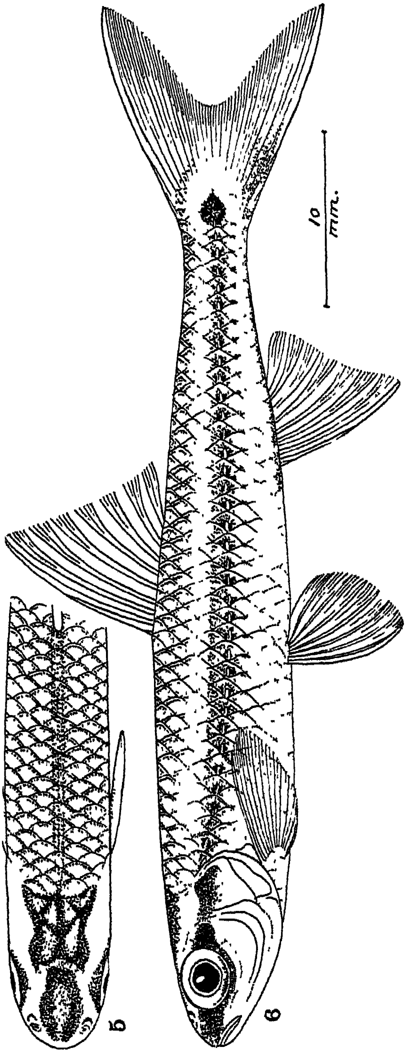
A.N.S.P. no. 69972. North side of Lake Waccamaw, Columbus County, North Carolina. May 22, 1939. Dr. Francis Harper. Length 73 mm. Type.

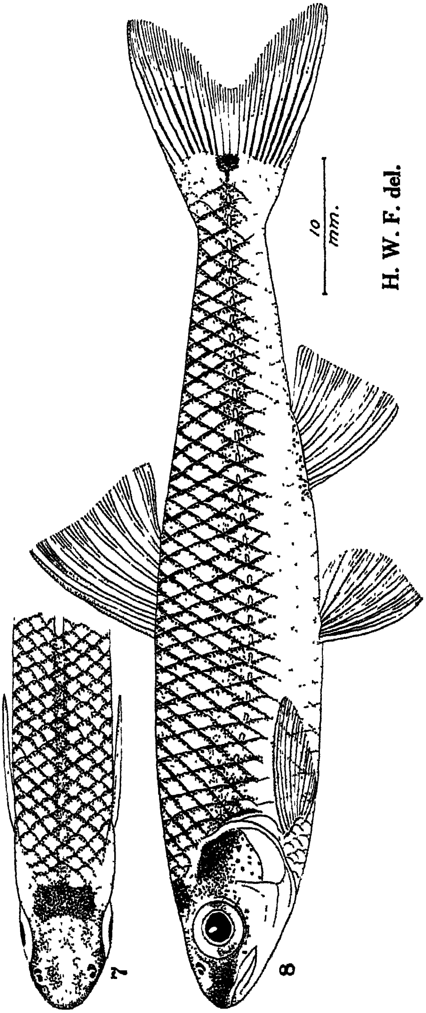
A. N. S. P. nos. 69973 to 69978. Same data as type. Length 49 to 71 mm. Paratypes. All taken "in edge of clear lake, with sandy bottom. Seined by colored fishermen."

Compared with the account of *Notropis brimleyi* B. A. Bean,[1] that species is described with a larger eye ($3\frac{1}{3}$ in head), pharyngeal teeth 2, 4—4, 2,

---

[1] Proc. U. S. Nat. Mus., vol. 26, 1903, p. 913 (type locality, Cane River, North Carolina).




10 mm.
H. W. F. del.
7
8

Figs. 5, 6.—*Notropis burchi* new species. Figs. 7, 8.—*Notropis waccamanus* new ecies.

scales 43 in lateral line, plumbeous lateral band from upper angle of gill cover to caudal where it broadens and extends to top of caudal peduncle, anterior parts of dorsal and caudal plain and posterior parts black, all details at variance with specimens I reported from Brevard.[2] These are all much deeper fish than *Notropis waccamanus*, or with the depth $4\frac{1}{4}$ to $4\frac{1}{5}$, larger head, more scales (6 or 7) above lateral line, smaller eye and more teeth (5) in larger pharyngeal row.

The most prominent character of *Notropis waccamanus* is its coloration, the bright shining lateral band reflecting like tin or mercury, imposed over a dark gray lateral band and ending in the restricted small black spot on the median part of the caudal base. Very likely this type of coloration may have suggested the vernacular name of " smelt minnow " heard at the time of its capture, according to Dr. Harper. Proposed common name, Waccamaw Shiner.

(Named for Lake Waccamaw, the type locality.)

Notropis henryi new species Figures 10 (predorsal view) and 11

Depth $4\frac{1}{10}$; head $3\frac{1}{2}$, width $1\frac{1}{2}$. Snout 3 in head, tip nearly level with lower edge of pupil; eye $3\frac{7}{8}$, $1\frac{1}{3}$ in snout, $1\frac{4}{7}$ in interorbital; maxillary reaches below eye $\frac{1}{3}$ its diameter, length $2\frac{1}{2}$ in head; mouth little inclined, large, lower jaw very slightly protruded; premaxillaries well protractile forward and downward; jaw edges firmly trenchant; lips little developed; interorbital width 3, low, broad, convex. Gill opening large, cleft well forward or nearly opposite hind eye edge. Gill rakers 2+5, of which 3 median on ceratohyal are double or bifid; $\frac{1}{3}$ of gill filaments, which are $1\frac{1}{3}$ in eye. Right pharyngeal teeth 4, 0, compressed, hooked, with broad grinding surfaces.

Scales 40+2 in lateral line, which is well decurved anteriorly; 8 above to dorsal origin, 4 below to ventral origin, 4 below to anal origin; 24 predorsal. Caudal base scaly. Chest, breast and prepectoral region with small scales. Scales all more or less narrowly imbricated. Lateral line complete.

D. II, 7, first branched ray $1\frac{1}{4}$ in head; A. III, 5, first branched ray $1\frac{1}{2}$; least depth of caudal peduncle $2\frac{2}{5}$; caudal 1, well emarginate behind; pectoral $1\frac{2}{5}$, rays I, 15; ventral rays I, 7, fin $1\frac{3}{7}$ in head.

Color when fresh in alcohol with back light brownish olive, each scale edged with darker and forming a reticulated pattern. Side of head and body with broad dark gray band, rather diffuse and only best defined as well as darker along tail posteriorly and on caudal peduncle; at caudal base narrowed and with subbasal black spot large as pupil, but not reflected out on median caudal rays. About shoulder girdle, suprascapular region and humeral region, as well as on opercle, pale rose to pink or reddish suffusion. Under surface of head and body, inclusive of caudal peduncle opaque white, only very pale tint of yellowish on sides and under surface of caudal peduncle. Head dark brown above, this shade distinct from dark gray lateral suffused band as represented on side of snout and postocular region. Iris dark gray, tinged with red and narrow ring of bright red around pupil. Under half of head white. Dorsal and caudal pale brown, with pink tinge. Pectoral pale brown, otherwise whitish. Ventral and anal white.

---

[2] Proc. Acad. Nat. Sci. Phila., 1922, p. 13, pl. 2, upper left figure (French Broad River at Brevard, N. C.).

A. N. S. P. no. 69979. Broad River near Bat Cave, basin of the Santee River, Henderson County, North Carolina. July 1, 1941. Length 71 mm. Type.

This specimen was obtained from among a numerous collection of bait fishes taken in the rapid rocky waters of the river, also with a few crayfishes. The bait fishes associated were *Nocomis leptocephalus* (Girard), *Rhinichthys atratulus* (Hermann), *Semotilus atromaculatus thoreauianus* Jordan, and *Ameiurus natalis* (Le Sueur).

Although only the type has been obtained, the species appears to be distinct in its unusual combination of characters. Its aspect is somewhat suggestive of *Notropis chiliticus* (Cope), but that species differs according to Cope's description with the orbit 3 in head and exceeding the length of the muzzle, small dorsal beginning above ventrals, and anal rays I, 8 (according to type, iii, 7). *Notropis henryi* has much smaller scales, longer muzzle, smaller eye, and different coloration. In its long maxillary it approaches *N. brimleyi*, but the presence of 8 scales between the dorsal origin and the lateral line differs, also greater body depth, more numerous predorsal scales, smaller eye and the coloration. Proposed common name, Broad Shiner.

(Named for my son Henry W. Fowler, Jr., who collected the type.)

PERCIDAE

Hadropterus nigrofasciatus westfalli new subspecies Figure 9

Depth $5\frac{2}{3}$; head $3\frac{2}{3}$, width 2. Snout (in profile) $6\frac{1}{4}$ in head, tip level with lower edge of pupil; eye $3\frac{1}{4}$, greatly exceeds snout or interorbital; maxillary short, reaches below front eye edge, length (in profile) 5 in head; mouth with short cleft, little inclined, jaws equal; teeth minute, in narrow bands in jaws, uniform, simple, pointed; dozen or more very small or microscopic short denticles along hind preopercle edge; opercle with spine; interorbital 5 in head, low, convex. Gill opening extends forward opposite hind pupil edge. Gill rakers 4+12?, lanceolate, $\frac{1}{3}$ of gill filaments which are $1\frac{2}{3}$ in eye.

Scales 53+4 in lateral line; 5 above to first dorsal origin, 10 above anal origin to lateral line; 19 predorsal; 5 across cheek to angle of preopercle

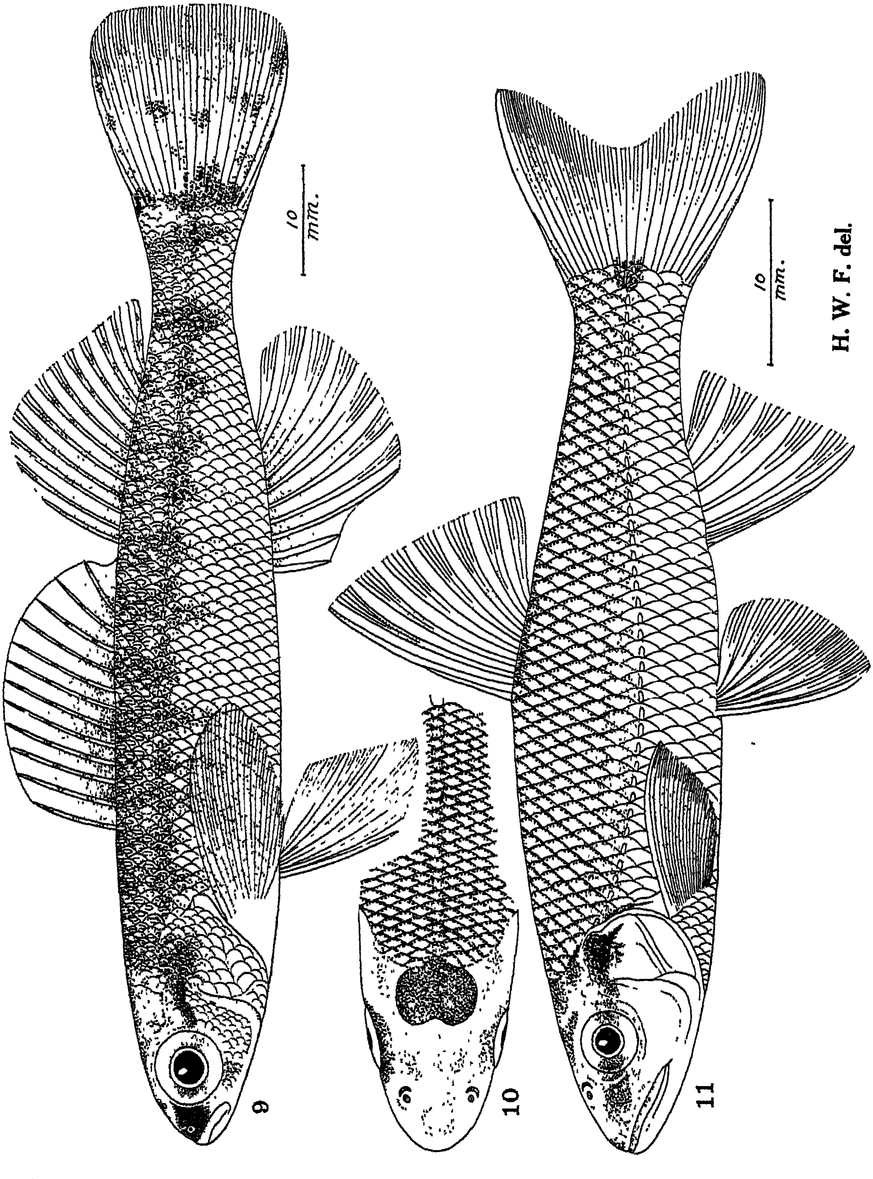

10 mm.
10 mm.
H. W. F. del.
9
10
11

FIG. 9.—*Hadropterus nigrofasciatus westfalli* new subspecies. FIGS. 10, 11.—*Notropis henryi* new species.

ridge. Caudal base scaly. Chest, breast and prepectoral region apparently scaleless. Opercle, subopercle and interopercle sealed, largest on opercle and subopercle. Lateral line complete, axial along side of body.

D. XII—I, 11, fifth spine 2 in head, second branched ray $1\frac{1}{5}$; A. II, I, 7, second spine $3\frac{3}{4}$, first branched ray $2\frac{2}{3}$; least depth of caudal peduncle $4\frac{1}{4}$; caudal slightly less than head, truncate behind; pectoral $1\frac{1}{8}$, rays I, 10; ventral I, 5, fin $1\frac{1}{4}$ in head.

Color in alcohol brown above on back and upper surface of head, below white. Each scale exposure on back with pale or light bar vertically. Dark brown lateral band from snout through eye to caudal base, on body intersected by 8 transverse blackish bars, alternating less distinct though otherwise similar in most of intervals; all reflected as black blotches in course of dark lateral band and also at bases of dorsals Dark bar below eye over cheek. Each dorsal spine with 3 dark gray spots. Dorsals and anals rather dark gray basally, otherwise pale. Caudal with broken dark basal transverse bar, and some gray blotches on fin. Paired fins pale.

A. N. S. P. no. 69980. Wekiwa River, from water lettuce and eel grass, Florida. March 8, 1941. Minter J. Westfall, Jr. Length 52 mm. Type.

Related to *Hadropterus nigrofasciatus* Agassiz, but that species differs in having a smaller eye. Compared with Alabama specimens of *H. nigrofasciatus* in most the eye is shorter than the snout, especially in the larger individuals, and in no case have I found it to exceed the snout. Proposed common name, Westfall's Darter.

(Named for Mr. Minter J. Westfall, Jr.)

NOTULAE NATURAE

NUMBER 108 OF SEPTEMBER 17, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NEW OR NOTEWORTHY SNAKES FROM PANAMÁ

BY EMMETT REID DUNN

Curator of Reptiles and Amphibians, The Academy of Natural Sciences of Philadelphia

Snakes received from Panamá in 1940 and 1941 (mostly from Dr. H. C. Clark) contain two novelties and a number of rarities and unusual extensions of range. It seems desirable to put these on record in advance of publication of the population data on some 11,000 snakes which Dr. Clark has sent me from six areas in Panamá.

Upland Darien

Dunn and Bailey (1939, Bull. Mus. Comp. Zool., 86, 1, pp. 3-22) reported on all known snakes from the uplands of Darien, a total of 172 specimens, representing 40 species. Two lots in 1941 (83 additional snakes from Cana, 2000 feet, received from Dr. H. C. Clark, and six snakes from Cerro Sapo, 3000 feet, received from the Fifth George Vanderbilt Expedition, 1941) enable me to add four species to the snake fauna of these uplands. The area contains 44 species (known from 261 specimens), 8 of which are unknown from lowland Darien (43 species, 3081 specimens). Of these one is endemic, and four are South American forms which enter North America only in upland Darien. The fauna of lowland Darien contains no species in either of these categories.

Dendrophidion bivittatus (Duméril and Bibron)

A head and neck from Cerro Sapo. This is new to Panamá and to North America (it has been reported from Panamá before, but erroneously).

Rhinobothryum bovallii Andersson

A head and neck from Cana. Now known from Siquirres and Limon, Costa Rica, from lowland and upland Chagres, Panamá savannas, and upland and lowland Darien.

NOTULAE NATURAE

NUMBER 108 OF SEPTEMBER 17, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NEW OR NOTEWORTHY SNAKES FROM PANAMÁ

BY EMMETT REID DUNN

Curator of Reptiles and Amphibians, The Academy of Natural Sciences of Philadelphia

Snakes received from Panamá in 1940 and 1941 (mostly from Dr. H. C. Clark) contain two novelties and a number of rarities and unusual extensions of range. It seems desirable to put these on record in advance of publication of the population data on some 11,000 snakes which Dr. Clark has sent me from six areas in Panamá.

Upland Darien

Dunn and Bailey (1939, Bull. Mus. Comp. Zool., 86, 1, pp. 3-22) reported on all known snakes from the uplands of Darien, a total of 172 specimens, representing 40 species. Two lots in 1941 (83 additional snakes from Cana, 2000 feet, received from Dr. H. C. Clark, and six snakes from Cerro Sapo, 3000 feet, received from the Fifth George Vanderbilt Expedition, 1941) enable me to add four species to the snake fauna of these uplands. The area contains 44 species (known from 261 specimens), 8 of which are unknown from lowland Darien (43 species, 3081 specimens). Of these one is endemic, and four are South American forms which enter North America only in upland Darien. The fauna of lowland Darien contains no species in either of these categories.

Dendrophidion bivittatus (Duméril and Bibron)

A head and neck from Cerro Sapo. This is new to Panamá and to North America (it has been reported from Panamá before, but erroneously).

Rhinobothryum bovallii Andersson

A head and neck from Cana. Now known from Siquirres and Limon, Costa Rica, from lowland and upland Chagres, Panamá savannas, and upland and lowland Darien.

Micrurus ancoralis jani Schmidt

A young female from Cana introduces this snake to the North American fauna. It was recently described from the Pacific coast of Colombia. The specimen has 286 ventrals; two-thirds of a triad on the nape; 15 complete triads on the body; one complete triad on the tail.

Trimeresurus schlegelii (Berthold)

One from Cerro Sapo.

Lower Chagres Basin (Madden and Gatun Lake areas)

I have examined 2746 snakes from this area, representing 61 species. This is the largest species list from any Panamanian area. Over 2230 of these snakes were received from Dr. Clark. The 1941 shipment contained only 161 specimens but added two species to the fauna.

The area fosters four species not known elsewhere; three species not otherwise known from lowland Panamá; one rather wide ranging form, which I am here reporting as new to Panamá, from two separated areas.

Sibynophis venustissimus (Gunther)

A specimen from the village of Agua Clara, just outside the Canal Zone and about four miles from the right bank of the Chagres. The genus is known from Madagascar, from southeast Asia, and from America (Mexico to Colombia). The species is known to me from: three specimens from Nicaragua, including the type, and a fourth reported (four localities); five Costa Rican specimens and a sixth reported (six localities); five Panamanian specimens, reported in this paper (two localities). In 1932 Amaral reported two specimens from Muzo, Colombia.

This specimen is the second *Sibynophis* from the Canal Zone area. Time may tell whether *S. zeteki*, described from the Pacific side of the Canal Zone (one specimen out of 4253 snakes examined), is an independent species or a case of discontinuous variation.

Hydromorphus clarki new species

TYPE.—A.N.S.P. 23910.

Type locality.—Agua Clara Village, near Chagres River, Panamá.

Diagnosis.—A *Hydromorphus* with 17 scale rows anteriorly; one prefrontal; one internasal; one postocular (temporal entering orbit); lower 2½ scale rows white (ventral color).

Description.—Head and neck only; 17 scale rows; a single nasal; one prefrontal; one internasal; six upper labials, the third in orbit; eight right and nine left lower labials, four in contact with anterior chinshields, which are longer than the posterior; one preocular (loreal entering orbit below it);

one postocular, partly fused with parietal on left side (temporal entering orbit below it); temporals 1–2; dark olive brown above, white below, demarcation at middle of row 3; small tubercles on snout and chin indicate a male.

Remarks.—Peters described *Hydromorphus concolor* in 1859. I have examined his type, a female from "Costa Rica." The United States National Museum has a female from San José, Costa Rica, which is conspecific with the type. This they have recently loaned me. When I was in Boquete, Chiriquí, Panamá, in 1939, my friend Slevin, of the California Academy of Sciences, showed me a male of a new species of *Hydromorphus* which he had recently taken in the vicinity. He has very kindly sent me a photograph and some information. I am indebted to the custodians of these three specimens. In these individuals there are two postoculars excluding the temporal from the eye; the dorsal pigmentation reaches the ends of the ventrals. The Boquete specimen has three prefrontals and only 15 rows of scales anteriorly.

Both San José and Boquete are at an altitude of 3800 feet; the Berlin type probably came from near San José; Agua Clara is less than 500 feet above sea level.

The hemipenis of *Hydromorphus* is identical with that of *Tretanorhinus;* the maxillary dentition is similar but with fewer (12–14) teeth; the head scales are reduced and more or less fused in *Hydromorphus;* the keel and the striations of the dorsal scales of *Tretanorhinus* are absent. No other ally can be mentioned, and it is almost certain that *Hydromorphus* is a depauperate *Tretanorhinus.* I previously thought *Hydromorphus* to be an upland derivative of the lowland *Tretanorhinus*, but the presence of both genera in the Canal Zone upsets that idea.

It is a pleasure to name this extraordinary find for Dr. H. C. Clark of the Gorgas Memorial Laboratory, from whom I have received more than 11,000 Panamanian snakes.

Upland Chiriquí

I have examined 370 snakes from this area, representing 32 species. Half of these occur in Panamá only in this area, two being endemic and 14 being known also from the uplands of Costa Rica. This is easily the most distinctive snake fauna in the Republic. Of these snakes 112 were sent in by Dr. Clark, mostly collected by the efforts of my friends the Monniches on their Finca Lérida above Boquete. It is desirable to put on record some of the recent finds.

Geophis godmani Boulenger

A single specimen without postocular sent in 1940 from Finca Lérida, Chiriquí. I know of four Costa Rican specimens: Irazu (B. M. N. H. 90–4–24, 10 Type), Escazu, Tierra Blanca, and one without definite locality received from the Museo Nacional and now in this Academy. The last has no postocular.

The *Geophis* of Panamá and Costa Rica may be distinguished as follows:

A. Six upper labials, fifth in contact with parietals.
  B. Supraocular present; posterior dorsals keeled; belly mostly dark; often with a light collar, or with light dorsolateral marking. *brachycephalus.*
  BB. No supraocular; dorsals smooth; belly white; no light markings except on rostral and first upper labial................*godmani.*
AA. Five upper labials, last in contact with parietals; dorsals smooth; belly mostly dark; no light markings.....................*hoffmani.*

Of these species *hoffmani* is the smallest and *godmani* the largest.

The material examined has been the following:

Geophis brachycephalus (Cope) 1871

Described from Costa Rica, this species has the following synonyms. I have examined all the types.

Colobognathus dolichocephala Cope 1871, San José, C. R.
Geophis moesta Gunthur 1872, Cartago, C. R.
Geophis chalybaea quadrangularis Gunther 1893, Cartago, C. R.
Geophis championi Boulenger 1894. Chiriquí, Panamá.

I have taken it at La Loma, at Lérida, and at Boquete in Panamá, and examined 103 Panamanian specimens from these localities. I have seen 43 Costa Rican specimens from 13 localities, mostly in the mountains, although it occurs as low as Guapiles.

Geophis hoffmanni (Peters) 1859

Described from Costa Rica. I have examined the type (Berlin 4003), taken it at Suretka in the Talamanca Valley, and at Navarro, and have seen altogether 40 Costa Rican specimens from 11 localities. It is known from Boquete in Panamá (U. Michigan 57955-6) from two specimens taken by the Gaiges in 1923.

Rhadinaea pachyura decipiens (Gunther)

A single specimen sent from Lérida in 1941. I have seen nine Costa Rican specimens, including the three cotypes in the British Museum, from

Irazu, one that I took at El Cedral de Navarro, one from San José, and two from La Palma. The white collar and the white stripe on the fifth scale row are very inconstant characters and this specimen lacks them. The white stripe on scale row one and the subpreocular scale are very constant characters and this specimen has them.

The intergradation of this form with *R. pachyura pachyura* (Cope), (of which I have examined the type from Sipurio in the Talamanca Valley of Costa Rica, one from Guapiles in eastern Costa Rica, and one from La Loma in Bocas del Toro, Panamá) is obvious as all three of the latter have a faint trace of a light stripe on the first scale row. In *pachyura* the light color of the top of the head reaches the end of the parietals, whereas in *R. d. fulviceps* (Cope) from the Canal Zone and Darien (I have examined the type and some 20 additional specimens) the light color of the head extends back over three or four nape scales, and there is no trace of a light stripe.

It is possible that this series of three forms may intergrade with *R. lateristriga* (Berthold) of Colombia and Ecuador, as the scalation is very similar, and the light stripes are in the position of those of *R. p. decipiens*.

Lowland Chiriquí

I have examined some 625 snakes from this area, representing 36 species, of which 602 (30 species) were sent in by Dr. Clark in 1940. These were gathered by local workmen through the cooperation of Mr. Thomas Yates, then of Farm Two of the Chiriquí Land Co., near Puerto Armuelles.

The fauna as a whole agrees with other lowland Pacific side Panamanian areas. One form seems to be endemic, three otherwise northern forms are present, and one form is otherwise known in North America only by a single specimen from Upland Darien. Climatically the area differs from the other Pacific lowland areas in that it receives sufficient summer rainfall to support forest growth and is botanically and climatically tropical deciduous forest (Amw) rather than tropical savanna (Aw). The incidence of fer-de-lance (27.3%) is extraordinarily high, but may be accounted for by a history of cane and banana cultivation.

Nothopsis rugosus Cope

Two specimens, from Farm Two, add to the seven previously known. Both have 28 scale rows and 10 upper labials. The seven specimens in this country have recently been counted for dorsal scale rows by Mr. Shreve of the Museum of Comparative Zoology (who has my thanks) and by myself. The dorsals are: 30 in one from Nicaragua; 30 in the Panamanian type and in another from Panamá; 28 in three Panamanian specimens; 26 in a Costa Rican specimen. The two British Museum specimens (one from Costa Rica and one from Ecuador), while said to have an odd number of scale rows, have counts below 30 and over 26.

The vertebrae have the neural spines expanded, flattened, and divided by a longitudinal groove. The paravertebral scale rows fit, each upon one of these bony bases, so that even scale rows must be the rule. Similar snake vertebrae have been described in the otherwise very dissimilar South American snake *Xenopholis.*

The skull of a specimen from Farm Two shows only faint traces of "independent supraocular bones," partial sutures only existing between them and the frontals. Dr. Malcolm Smith has suggested an alliance of *Nothopsis* with the Oriental genera *Fimbrios*, *Achalinus, Stoliczkaia,* and *Xenodermus.* This is perhaps correct, but the group cannot be defined, and merges into normal snakes. *Nothopsis,* itself, is very different from any other American snake.

Sibynophis venustissimus (Gunther)

Four from Farm Two. I have mentioned above the pertinent facts regarding this form.

Rhadinaea decorata (Günther)

In 1939, when Dunn and Bailey reported on snakes of eastern upland Panamá, the variant of this form with continuous light lines from eye along body (*ignita* Cope) was recognized as a Darien race, based on four specimens, although complete intergradation was known from the Canal Zone (a strong majority there being of the typical form, with two breaks in the light line). Nine specimens from Farm Two include no typical *decorata,* one with one break on one side only, one with one break on each side, seven "*ignita*" with no breaks at all. The status of *ignita* as a race with definite distribution is therefore very questionable, and probably the form should be dropped. It is still worth noting that this variant is known only from Panamá.

Rhadinaea persimilis Dunn

A single Farm Two specimen is the fifth known specimen, the second from Panamá, and the first from Chiriquí. It has a subpreocular on each side, seven right upper labials (3–4 in eye), and eight left upper labials (4–5 in eye).

Dipsas anthracops (Cope)

A head from Farm Two has the following characters: wide dark and light bands; 13 dorsals, the vertebral not enlarged; normal geneials; eight upper labials, fourth and fifth in orbit; an upper and a lower preocular do not exclude loreal from orbit; three postoculars; temporals 2–3 on right, 3–3 on left. This specimen is referred to *anthracops* (of which I have examined the type from " Central America," two from Nicaragua, and three from Pacific side Costa Rica, including the type of *Sibynomorphus ruthveni* Barbour and Dunn) for the time being. It differs from the others in having preoculars, in having three instead of two postoculars, in having eight upper labials, in having 2–3 anterior temporals instead of one. It (and the others) differs from the type of *ruthveni* in having 13 instead of 15 dorsals.

Two other similar forms are known from the Panamá-Nicaragua area, with normal geneials and wide dark and light bands. These are Atlantic side and have 15 dorsals (vertebral enlarged); 9–10 upper labials; and much longer tails (more subcaudals) than *anthracops*. They are: *viguieri*, of which I have examined the type and eight others from the Canal Zone and eastern Panamá; *articulata*, of which I have examined the type and three other specimens from western Panamá and Costa Rica. These differ only in ventral and caudal counts.

The head from Farm Two is anatomically and geographically nearer to *anthracops* than to *viguieri-articulata*.

Erythrolamprus mimus impar Schmidt

Twelve specimens from Farm Two.

A male, A.N.S.P. 22565, has 181 ventrals, 18 black body rings, and the light head band is immaculate. The high count of body rings, and the immaculate head band place this population with *impar* (of Nicaragua and Honduras) rather than with *micrurus* (of the Canal Zone and Darien). No *impar* are known from Costa Rica, in which country *E. bizona* is the only known form, and *E. bizona* is a widespread and abundant Panamanian form. Both *bizona* and *mimus micrurus* occur together in Panamá and in Colombia. I have seen 10 Nicaraguan *impar* from 7 localities; 58 Costa Rican *bizona* from 13 localities; 12 Panamanian *impar* from Farm Two; 18 Panamanian *micrurus* from 9 localities; 242 Panamanian *bizona* from 23 localities. *E. bizona* and *E. mimus micrurus* seem quite distinct species.

Trypanurgos compressus (Daudin)

Three from Farm Two. Previously known from North America only from a single specimen from Cana, Darien, 2000 feet elevation.

Micrurus clarki Schmidt

Three from Farm Two help to close the gap between the single Costa Rican specimen and the other Panamanian ones (one from the Pacific side of the Zone, six from the Atlantic side of the Zone, 16 from lowland Darien and one from upland Darien).

Micrurus nigrocinctus yatesi new subspecies

TYPE.—A.N.S.P. 22564, collected by Mr. Thomas Yates and his men. Sent in by Dr. Clark in 1940.

Type locality.—Farm Two, Chiriquí Land Company, near Puerto Armuelles, Chiriquí, Panamá.

Range.—Known only from type locality.

Diagnosis.—A race of *M. nigrocinctus* in which, with age, the red rings turn black dorsally; adult a coral snake ringed black and yellow above; black, yellow and red below; black nape ring involves 5–7 throat ventrals.

Description.—Since none of the specimens are complete it is impossible to add much to the diagnosis.

Three small specimens (indistinguishable from *M. nigrocinctus nigrocinctus* and one considered as such by K. P. Schmidt) and five larger ones (all showing the blackened red rings) were in the shipment. The throat ventrals involved by the nape ring were five in three specimens (including the type and two small ones) six in two specimens (both large), and seven in the biggest. One small and one large one were presented to Field Museum before this count was made. The precise color of the type is: a black snout which involves upper labials 1–4; mental and lower labials 1–3; postoculars, frontal, supraoculars, anterior edge of parietals (as in *nigrocinctus nigrocinctus*); a light ring involving parietals, temporals, posterior labials and one nape scale; a black ring 6–7 scales long above; a two scale yellow ring; a 6–7 black ring (red below); a two scale yellow ring; a four scale black ring (black below); etc.

Remarks.—I have seen some 15 *M. nigrocinctus* from upland Chiriquí. One of these from Boquete (Mich. 57949) is very dark above and may show some transition to the present form.

I have seen three *M. nigrocinctus* from Boruca and Buenos Ayres, Costa Rica, in the low Golfo Dulce area adjacent to Chiriquí. They appear typical *M. n. nigrocinctus* to me despite the fact that one of them, A.M.N.H. 17365, served as a paratype of the Atlantic Coastal form *M. n. mosquitensis*.

Thus the range of this form would seem to be surrounded by that of the typical race.

A similar darkening of the red rings above is seen in *M. ephippifer*, known from three females from Oaxaca in Mexico.

NOTULAE NATURAE

NUMBER 109 OF NOVEMBER 3, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

AN EDENTATE FROM THE OLIGOCENE OF WYOMING

BY EDWIN H. COLBERT

Associate Curator, Department of Geology and Paleontology,
The Academy of Natural Sciences of Philadelphia

Introduction

An expedition from the Academy of Natural Sciences of Philadelphia was sent to the Hat Creek Basin region in eastern Wyoming during the summer of 1941 for the purpose of continuing investigations begun in the previous year on the Oligocene sediments of that area. This expedition, under the leadership of Mr. Robert G. Chaffee of the Academy Staff, was successful in that it collected a good representation of fossil mammals from the various Oligocene levels of the Hat Creek Basin. Among the fossils collected, perhaps none is more important than the specimen that is described in the present contribution, since it represents an entirely new and an exceedingly rare element in the " White River " faunas of North America—namely an edentate of unexpected form and occurrence. Up until the present time a single skull, found in the Oligocene of Montana, formed the sole record of the Edentata in the post-Eocene—pre-Pliocene beds of North America; this was the specimen collected and described by Douglass, now housed in the Carnegie Museum of Pittsburgh and known as *Epoicotherium unicum* (Douglass). As will be shown below, the new fossil although related to *Epoicotherium*, is a distinct genus, and its discovery in the Brulé formation of the White River series is a striking illustration of the fact that no matter how thoroughly a fossil fauna may have been studied over a long period of years, embodying both active collecting in the field and careful research in the laboratory, there are always possibilities for new elements appearing as a result of the constant application of detailed methods of work.

At this place the fullest credit should be given to Mr. Chaffee and the members of his field party for the careful collecting, whereby this specimen, as well as numerous other elements, already known, of the microfauna of the Brulé formation were discovered. Also acknowledgment of Mr. Chaffee's skillful preparation of the specimen in the laboratory is hereby made with the greatest appreciation. The drawings for this paper were made by

Miss Helen Winchester, who also retouched the photographs, which were made by A. Delwin Warden. Special acknowledgments are due to the Carnegie Museum of Pittsburgh, and to Mr. J. LeRoy Kay of that institution, for making available the type skull of *Epoicotherium unicum.* This expedition was financed in part by a grant-in-aid from the Eldridge Reeves Johnson Fund by the American Philosophical Society.

Taxonomy

Order EDENTATA Vicq d'Azyr, 1792

Suborder PALAEANODONTA Matthew, 1918

Revised definition.—Ancestral edentates with nomarthrous vertebrae, relatively low, broad skulls, small centrally placed orbits and shallow mandibular rami. Canine teeth present and showing the normal canine occlusion, with enamel preserved in the more primitive forms. Post-canine teeth secondarily simplified to the form of simple pegs, without enamel in the later forms, and variously reduced as to number.

Family **EPOICOTHERIIDAE** Simpson, 1927

Revised definition.—Small subterranean edentates, with depressed snout, domed, transversely broadened occiput, slender zygomatic arches, no postorbital processes, sagittal crest lacking, medium to large completely ossified tympanic bullae, canine teeth present and retaining the primitive canine functional relationships, cylindrical, one-rooted cheek teeth without enamel.

TYPE.—*Epoicotherium* Simpson (=*Xenotherium* Douglass, not *Xenotherium* Ameghino).

Distribution.—Oligocene of North America.

EPOICOTHERIUM Simpson, 1927

Revised definition.—Pterygoids extended back and ankylosed with auditory bullae; without hamular processes. Six upper cheek teeth of which the first (canine) is larger than the rest and semiprocumbent.

TYPE.—*Epoicotherium unicum* (Douglass).

Distribution.—Oligocene, McCarty's Mountain (=Chadron [Scott]) of Montana.

Epoicotherium unicum (Douglass, 1905)

Definition.—The definition is the same as that for the genus, above.

TYPE.—Carnegie Museum no. 1018, a well-preserved skull.

Distribution.—See the distribution given for the genus, above.

XENOCRANIUM[1] new genus

Definition.—A small edentate, but much larger than *Epoicotherium*, with a depressed snout and an elevated, greatly broadened occiput; orbit without postorbital processes; bullae transversely elongated and prominent below level of the basicranium; very large, bulbous expansions of the squamosal external to the bullae and at the posterior termination of the zygomatic arch; mandible shallow, with a broad, internal shelf; teeth simple and peg-like, without enamel; five cheek teeth in the maxilla and six in the mandible, of which the anterior one (canine) in each jaw is much larger than the rest of the teeth.

TYPE.—*Xenocranium pileorivale* new species.

Distribution.—Oligocene, Brulé formation of eastern Wyoming.

Xenocranium pileorivale[2] new species

Definition.—Since this is a monotypical genus, the definition for the species is the same as that given for the genus, above.

TYPE.—Acad. Nat. Sci. Phila., no. 14984, a skull and mandible, the former lacking the tip of the snout, the zygomatic arches and the bony surface of a portion of the cranium, the latter lacking the anterior and posterior portions of the rami. Some loose teeth, obviously belonging to the type specimen, and an occipital condyle are associated with the above skull and jaw.

Locality.—The type and to date the unique specimen was found about 15 miles east of Hat Creek Postoffice, Wyoming, specifically in the southwest quarter of section 14, range 61 west, township 34 north. The horizon is Brulé, about 160 feet below the top of the Oligocene as it is developed in this area.

Description

As has been indicated in the generic definition of this new animal, this is a relatively small mammal of edentate affinities, somewhat larger than *Epoicotherium*, the genus to which it may be most readily compared in structure and relationships. In fact, the present form is about twice as large in its linear dimensions as the edentate described by Douglass from the Oligocene of Montana.

---

[1] From *ξένος* = strange; *κρανίον* = skull.

[2] From pileus = hat; rivalis = pertaining to a brook. In reference to the Hat Creek basin, in which the type specimen was found.

The features in the skull of *Xenocranium* which immediately strike the eye are the depressed snout, the elevated, transversely expanded occiput and particularly the peculiar swellings of the squamosals at the posterior terminations of the zygomatic arches. These latter features will be described in more detail below; suffice it to say at this place that the very peculiar proportions of the skull are due in large part to the presence of these structures. All in all this is a very broad skull throughout, and especially in the occipital region (in fact the greatest breadth of the skull somewhat exceeds its length), but that the tendency toward lateral expansion is due not alone to the inordinate broadening of the occiput is shown by the fact that the palate is very broad.

The centrally placed orbit is rather deep and without a postorbital process, resembling in this respect the orbit as it is developed in *Epoicotherium* and in many of the true Xenarthra. It seemingly is relatively larger than the orbit in *Epoicotherium.* The anterior border of the eye is situated above the third cheek tooth, as contrasted with its position above the fourth cheek tooth in *Epoicotherium,* while beneath the orbit is a large, well-developed infraorbital foramen. In this latter feature the form under consideration may be contrasted with *Epoicotherium,* in which there are two small infraorbital foramina on either side. It is not possible to locate for certain a supraorbital foramen, but it is probable that a small one may have existed, as in the Montana Oligocene edentate with which the present genus is being compared.

The cranial portion of the skull is swollen and rounded on top, with the frontals and parietals rather broad and smooth. Although the actual bone is missing from the top of the cranium, so that the endocranial cast is exposed in this region, there is an indication that the sagittal crest was either very low or completely suppressed in *Xenocranium.*

Unfortunately the zygomatic arches are both missing, but the broken anterior and posterior terminations would seem to indicate that these structures were very slender in *Xenocranium* as they are in *Epoicotherium* and in many of the later edentates. There is a distinct possibility that the arches may have been incomplete in *Xenocranium,* but this is a question which cannot be definitely answered on the basis of the present material, and until evidence is found at some future date to support this possibility it might be best to assume that the arches were probably slender as in *Epoicotherium.*

The expansion of the squamosal bones at the posterior termination of the zygomatic arches form the most striking feature of the skull, as has been pointed out above. There can be no doubt but that these expansions are in the squamosal itself, and that they are independent of the development of the bullae, even though at first sight these structures give the impression of being in themselves some sort of " bullae." In fact, the squamosal expansions are much larger than the bullae, which latter structures are well exposed on the basicranial surface of the skull, and it may be that, lying as they do above, external and contiguous to the bullae these expanded " bulbs," if so they may be called, supplement in some fashion the regular auditory apparatus. It would be interesting to see by sectioning if there might be some sort of a tubular connection between the cavity of each bulla and the cavity of the squamosal expansion, in other words to determine whether or not this peculiar structure in *Xenocranium* forms an accessory resonating chamber. That such might be the case is indicated by the broken surface exposing a portion of the internal mold showing these expansions to be hollow—not cancellous. It is felt, however, that such a procedure is not justified at the present time when only the type specimen of this very strange mammal is known; consequently the final solution as to the function of the squamosal expansions in *Xenocranium* must await some future date, when more material is available. It might be said here that this squamosal expansion seemingly is unique among the mammals, for so far as can be determined from the literature nothing exactly like it has been described before, while the nearest approach to it is found in an analogous but quite dissimilar chamber developed in the squamosal of *Manis*. A comparison of this portion of the skull in *Xenocranium* and *Manis* will be made below.

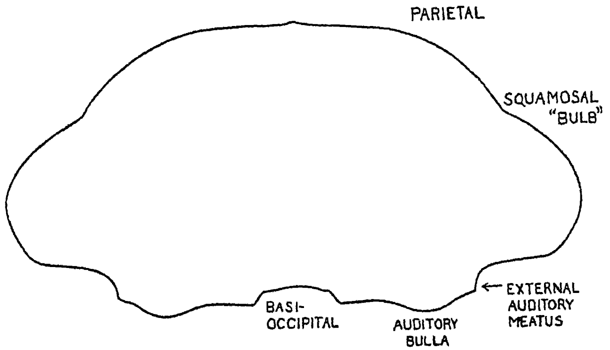
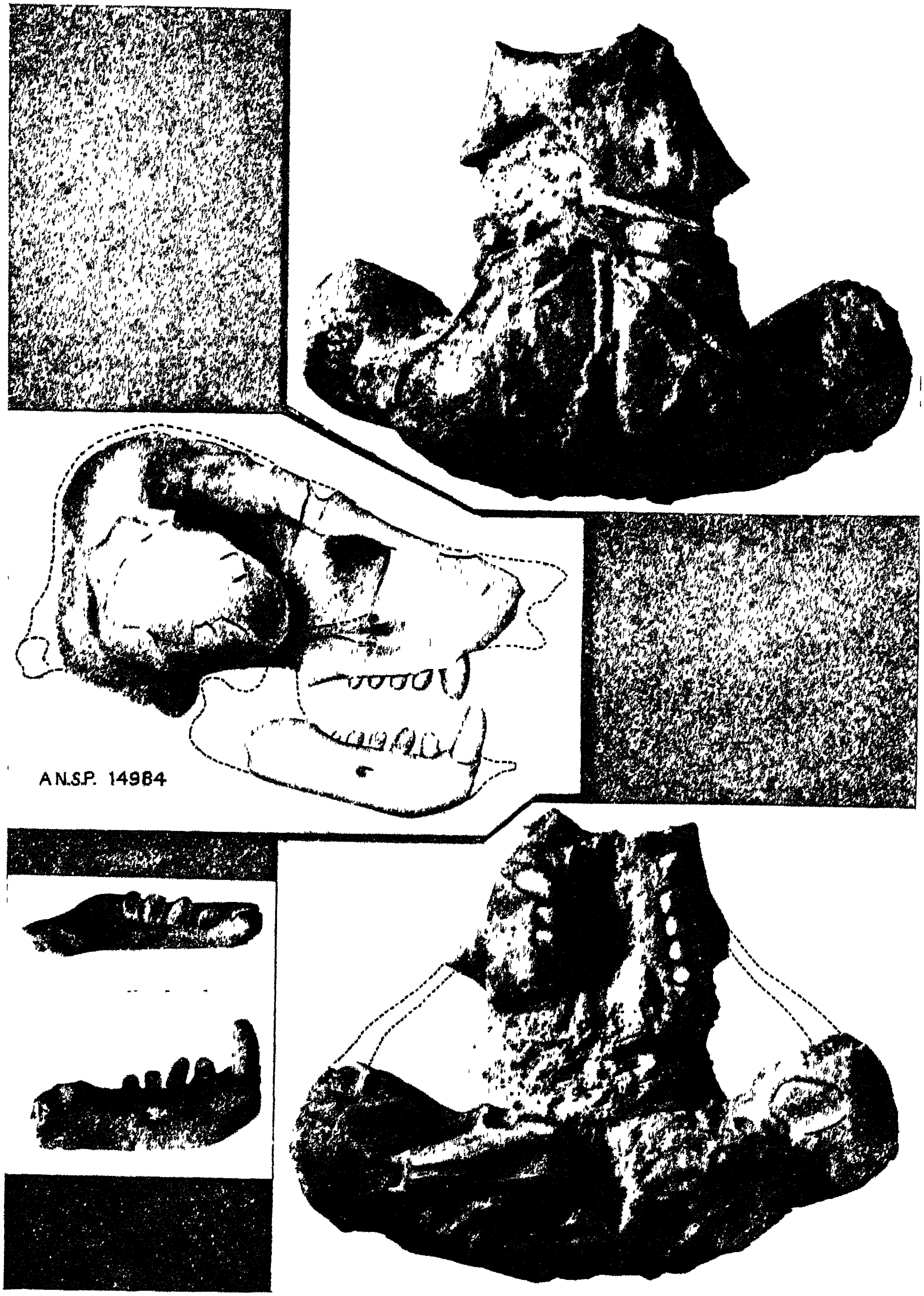


FIG 1. *Xenocranium pileorivale* new genus and species. Acad Nat Sci. Phila., no 14984 Restored outline of occiput of type skull, to show proportions. Twice natural size



Explanation of Plate at bottom of p 7

On the ventral surface of the squamosal expansion is the flat glenoid, bounded posteriorly by a weak postglenoid process, and more particularly by the bulla, as is the case in *Epoicotherium* and in the dasypods.

The auditory bullae are well developed and completely ossified. These are transversely elongated structures, occupying the usual position on the basicranium and therefore lying ventral and internal to the squamosal expansions. The bullae in *Xenocranium* are somewhat pear-shaped and are fairly well rounded, contrasting in this particular with the rather flattened bullae of *Epoicotherium*. On the other hand the bullae of this new genus are much more restricted in their basicranial extent than are those of *Epoicotherium* so that they do not cover a great portion of the basicranium as they do in the Montana form. Moreover, a close scrutiny of the anterior borders of the bullae in *Xenocranium* fail to reveal any indication that there was a connection between these structures and the pterygoids as is so characteristic of *Epoicotherium*. It is difficult to say exactly what elements constitute the bullae in *Xenocranium*, but it would seem probable that in the main they are composed of the tympanics. There is a seeming division between the main portion of the bulla and its most posterior extension that would indicate with some degree of reason the possible presence of the entotympanic as composing this back part of the structure. The external auditory meatus occupies a position beneath the squamosal " bulb." Unfortunately the preservation of the skull is such that the basicranial foramina are not well shown, so that only the foramen lacerum posterius and more doubtfully the foramen lacerum medius may be identified, occupying their usual positions with relation to the bullae.

A very slight groove or depression on the basal portion of the squamosal bulb, running laterally from the external auditory meatus, may be an indication that there was in *Xenocranium* a cartilaginous tubular extension of the meatus to a laterally placed pinna. The position of the pinnae in *Xeno-*

EXPLANATION OF PLATE

Xenocranium pileorivale new genus and species. Acad Nat. Sci. Phila., no. 14984, type, skull and mandible

Top right, skull, dorsal view. Bottom right, skull, palatal view. Bottom left, left mandibular ramus (reversed), with the crown view above and the external lateral view below Center, skull and mandible, lateral view of right side. In this view the left mandibular ramus, being the more complete of the two, has been reversed and represented as on the right side. This is a perspective drawing, not an orthogonic projection, so the squamosal bulbs appear slightly larger in relation to the skull than is actually the case. (All figures twice natural size).

cranium must have been peculiar, to say the least; perhaps the most logical assumption would be to suppose that they were placed on the sides of the squamosal expansions, at the terminations of straight, cartilaginous tubes. Of course such a position would put the ears quite far apart. An alternative assumption would be to suppose the presence of a long, curved tube from the bony meatus to the pinna, carrying the latter structure to a rather dorsal position on the side of the skull However, at this distant date, the lateral position for the ears, even though it places them peculiarly far apart, would seem to be the most logical solution for the problem.

There is a break across the skull just anterior to the basicranial region, in consequence of which the pterygoids on the ventral surface have been completely lost. It was stated above that there is reason to think that these structures did not reach the bullae, as they do in *Epoicotherium*—beyond this statement nothing definite can be said as to the structure of this region of the skull. There is some slight indication that the border of the posterior nasal choanae may have been located opposite the third cheek tooth, but even this point cannot be definitely decided.

As was mentioned above, the frontal and parietal bones are largely missing on the top of the skull, thereby exposing the endocranial cast. This indicates a rather expanded and smooth cerebrum.

A portion of a right occipital condyle was found with the skull of *Xenocranium*. A diligent search has unfortunately failed to reveal any contact between this element and the skull in question, so its exact position upon this skull (presuming it to belong to the form under consideration) cannot be determined. This condyle would seem to have been carried upon an exoccipital pedicle, whereas in *Epoicotherium* and the modern dasypods the condyle is very closely appressed to the occiput. It is broad, bearing about the same relationship in its width to the width of the occiput as is shown in *Epoicotherium,* between homologous points. It is seemingly more strongly convex than the condyle in *Epoicotherium,* a feature that may be related to the greater size of *Xenocranium,* since in this respect it shows an approach to the still larger dasypods.

The mandible is shallow, as might be expected in an animal of edentate affinities, and is characterized especially by a rather broad internal shelf in the region of the cheek teeth.

The teeth are simple and peg-like. Although *Xenocranium* is almost twice as large as *Epoicotherium* in its linear dimensions, its maxillary tooth row is scarcely any longer than the tooth row in the Montana genus. Of course there is to be considered the fact that *Xenocranium* has one less maxillary tooth than *Epoicotherium,* but even so the ratios between skull size and tooth dimensions are quite different in the two forms. As pointed out in the definition of the present genus, there are five teeth in the maxilla and six in the mandible, of which the anterior tooth in each case is larger than the succeeding teeth. There is every reason to think that this anterior tooth is homologous with the canine in other mammals—in *Palaeanodon* or *Metacheiromys,* for instance—and that the same relationship holds in *Epoicotherium.* This statement is supported by the manner of occlusion of the enlarged first teeth in the upper and lower jaws of *Xenocranium,* for they show the normal canine bite, the lower one occluding in front of the upper one. The teeth in *Xenocranium* show homogeneous external surfaces and a close examination would seem to indicate that they are composed entirely of dentine. Thus these teeth resemble the teeth in certain later edentates, especially those of the Dasypodidae, and they afford additional proof of the fact that the enamel was lost from the edentate dentition by Oligocene times. That enamel was present in the edentates of the Eocene is shown by the canines of the Eocene palaeanodonts and by the cheek teeth of a South American Eocene dasypod described by Simpson. The

Measurements, in millimeters

	Metacheiromys A. M.[1] 11718	*Palaeanodon* A. M. 15086	*Epoicotherium* C. M.[2] 1018	*Xenocranium* A N S P. 14984
Skull: Length	97.0[3]		32.3+	
Length C—condyle	88.5	65.0[4]	26.5	31.0[4]
Breadth—occiput	52.7	34.8	22.7	41.6
Breadth—Ext. aud. mea. .	45.0		18.4	26.0
Height—occiput	23.5[5]	23.2	13.8	19.0+
Height—at orbit	21.5	15.0[3]	7.5	10.9
Width of palate	13.5	13.0	4.7	8.1
Breadth of bulla	18.7	9.5	8.8	10.7
Length of bulla	20.0	10.5	5.2	6.5
Length—cheek teeth	2.6[6]	9.5 (+?) 11.0[4]	8.9	9.2
Ant.-post. dia canine	5.9		1.7[7]	2.1
Jaw. Length	72.0			
Depth of ramus	6.5			4.6
Length—cheek teeth	6.0			10.8
Ant.-post dia canine	4.1			2.0

1 A. M. = American Museum of Natural History 2. C. M. = Carnegie Museum of Pittsburgh. 3. = Approximate 4 = Estimated 5. = Crushed 6 = Diameter of single tooth. 7. = Alveolus

upper cheek teeth of *Xenocranium* bite down outside of the lower cheek teeth, so that the former show oblique wear on their inner surfaces, while the latter show a similar type of wear on their outer surfaces. Here we see perhaps the retention of a primitive character; *Xenocranium* had not advanced to the stage where the upper and lower teeth were truly opposed to each other, even though these teeth had already assumed peg-like shapes.

Ratios

	Metacheiromys	*Palaeanodon*	*Epoicotherium*	*Xenocranium*
A. $\frac{\text{length of cheek teeth}}{\text{length c.—cond. (100)}}$	3	17 (est)	34	30
B. $\frac{\text{height skull, orb.}}{\text{length c.—cond. (100)}}$	27	23	28	35
C. $\frac{\text{height skull, occip.}}{\text{length c.—cond. (100)}}$	37	36	52	65
D. $\frac{\text{breadth skull, occip.}}{\text{length c.—cond. (100)}}$	60	54	86	134

Discussion

In the foregoing description there have been frequent allusions to *Epoicotherium,* the only other edentate known at the present time from the Oligocene of North America. It is felt here that there is a true genetic relationship between *Xenocranium* and *Epoicotherium,* something beyond the mere fact of their contemporaneity, and the reasons for this view may now be considered.

In spite of the general dissimilarities in appearance between the two type skulls, there are many characters that link the specimens. Both are small, although the new form is admittedly about twice the size of the Montana genus. What is more important is the similarity between the dentitions of the two genera. In both forms the teeth are peg-like—the result of secondary simplification—and without enamel. In both forms there is a large anterior tooth, without much doubt the canine, followed by a row of cheek teeth; five in the maxilla of *Epoicotherium,* four in *Xenocranium.* If *Epoicotherium* is an earlier, and in some ways a less pecialized genus than the new form here described, the presence of one more tooth in the maxilla than is present in *Xenocranium* is not in the least surprising. Perhaps the principal difference between the two genera in the dentition is in the position of the canines, which in *Epoicotherium* are semiprocumbent, and with a long alveolar portion curving back within the maxilla above the cheek teeth, a decided contrast to the canines of *Xenocranium* which are erect, seemingly short, and similar except for their greater size, to the cheek teeth. But here again the difference is probably one of degree rather than of kind; the canines of *Epoicotherium* are less specialized than those of *Xenocranium* and thus show more of their primitive character.

In both genera the skull is broad at the occiput, narrow at the snout; elevated in the occipital region and depressed at the snout. These characters, very strongly developed in *Epoicotherium,* tend to be extreme in *Xenocranium* especially as regards the great occipital breadth of this latter

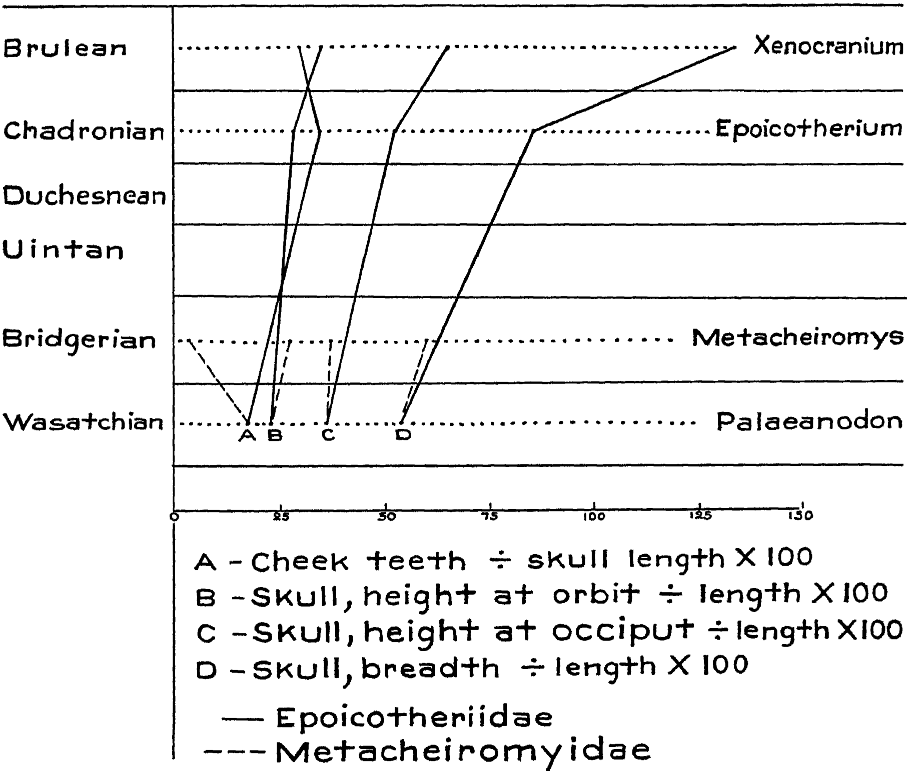


FIG. 2. Diagram to show evolutionary trends in the skull of the Palaeanodonta.

form. In both genera the orbit is centrally placed, and without any post-orbital process. A difference is to be seen in the infraorbital foramen, which is large in *Xenocranium* and which consists of two rather small openings or canals in *Epoicotherium*. On the other hand both genera are more or less alike in the weak zygomatic arches and the swollen, smooth cranium.

In certain characters there are strong differences between the two genera, and these differences, the result of divergent evolution along separate habitus trends, are the most striking characters of the skulls. Thus *Xenocranium* has the large, bulbous expansions of the squamosals at the posterior termination of the zygomatic arches, which are in decided contrast to the condition in *Epoicotherium*, even though this latter genus does show a certain amount of expansion in this region. On the other hand *Epoicotherium* has greatly expanded bullae, which are not found in *Xenocranium*, while in the Montana genus the pterygoids are extended backwardly to connect with the bullae, again a difference from the Hat Creek specimen.

Yet in spite of these several differences, the resemblances between the two forms are considered as important and diagnostic—sufficiently so that both genera may be placed in a single family, the Epoicotheriidae. These are the basic heritage characters, carried over from their Eocene ancestors, and as such should decide the relationships of the two forms. The specialized characters that mark these two fossils as generically distinct are, on the contrary, subsequently developed habitus features that should not be allowed to obscure the basic taxonomic relationships of the genera under consideration.

Just as the basic heritage characters tend to unite *Xenocranium* and *Epoicotherium* in a single family, so they also afford strong links connecting both of these genera with the Eocene genera *Palaeanodon* and *Metacheiromys*, constituting the family Metacheiromyidae, which also belongs to the order Palaeanodonta. Of particular importance in this respect are the peg-like teeth, the rather broad basicranium, the smooth brain case, the small, centrally located orbit, the flat glenoids and the shallow mandibular ramus characteristic of *Palaeanodon*. This Eocene genus shows various primitive traits which as the result of evolutionary specializations have been lost in the Oligocene edentates of North America, notably the generally low skull, with a comparatively "normal" (i. e. not a swollen) braincase, strong zygomatic arches, a rounded, partially cartilaginous bulla and the presence of a well-developed angle on the mandible. There are four maxillary teeth known in *Palaeanodon*, all of which are certainly post-canines—whether more teeth were present in this genus is a matter of conjecture at the present time. An examination of the type skull gives the general impression (which however cannot be proved) that the anterior of the first four teeth probably was the first post-canine tooth; if so this genus would show more reduction in the number of cheek teeth than is found in the Oligocene form.

However, such a condition, if actually the case, would not be unexpected in *Palaeanodon*, because the succeeding genus, *Metacheiromys*, from the Middle Eocene, is typified by the almost complete suppression of the post-canine cheek teeth. Evidently this trait was established early in the Eocene palaeanodonts, so it is necessary to regard the Oligocene edentates as representing a divergent evolutionary branch which split off from the *Palaeanodon-Metacheiromys* line at a very early stage in the phylogenetic development of all of these animals.

Metacheiromys, although clearly derived from *Palaeanodon*, as has been so ably shown by Simpson, follows a line of adaptation quite divergent from that of the general *Epoicotherium*, *Xenocranium* trend. It is characterized by the retention of certain *Palaeanodon* characters, such as the low skull, the strong zygomatic arch and the angle on the mandible, combined with the accentuation of other traits already apparent in the earlier genus, notably the great reduction of the post-canine teeth. In *Metacheiromys* the canines remain large, retaining not only their normal canine function but also enamel on their surfaces. In this genus the mastoid is strongly inflated, and the bulla is completely ossified.

These are the closer relationships of *Xenocranium;* what then are the more general affinities of this animal? As a palaeanodont this animal may be regarded as of broad edentate relationships, a point which needs little elaboration at this place since it has already been thoroughly discussed by Matthew and by Simpson. Indeed, the remarks made by the latter author with regard to the relationships of the palaeanodonts apply very well in this present consideration as to the general taxonomic position of *Xenocranium*.

" The palaeanodonts are aberrantly specialized in several respects, and in others they may even have acquired particular edentate specializations earlier than they probably appeared in the ancestral xenarthrans . . . they have, either typically developed or incipient, all the general ordinal characters of the xenarthra." [3]

Simpson has shown how strikingly similar are the skulls of *Epoicotherium* and *Chlamyphorus*, the pigmy armadillo or pichiciégo, probably the result in part of parallel evolution. Yet as he has shown, there are certain basic resemblances between *Epoicotherium* and the dasypods, and it may be said that the same is true in the present case of *Xenocranium.* The low skull, the small, depressed orbit, the expanded cranium, the broad occipital region, and especially the simple, peg-like, enamel-less teeth, are all points in the present specimen that give weight to this argument.

---

[3] Simpson, George Gaylord. 1931. Bull. Amer. Mus. Nat. Hist. LIX, pp. 367-368.

Consequently it would seem logical to regard *Epoicotherium* and *Xenocranium* as specialized palaeanodonts, showing certain structural modifications paralleling those of the dasypods. It seems logical to suppose that the palaeanodonts and dasypods were derived from a common ancestry, but at a point antecedent to the appearance of *Palaeanodon* itself, the evidence for this being most strikingly strengthened by the presence of a well-defined dasypod, *Utaetus buccatus* Ameghino, in the lower Eocene of Patagonia. Therefore the palaeanodonts are collateral to, not ancestral to the primitive xenarthrans as represented by the very early dasypods.

There remains the question of relationships between *Epoicotherium, Xenocranium* and the Pholidota, as typified by *Manis.* Unfortunately the fossil history of the Pholidota is virtually unknown (disregarding here the very questionable limb elements and like remains from the Tertiary of Europe and sometimes attributed to this group of mammals). However, the recent form, *Manis,* does show certain characters which have led to its affiliation by various authors in a greater or lesser degree with the edentates. The consensus of recent workers is that this is an isolated group, but possibly related through its very remote ancestry to the edentates.

There are indeed some striking similarities between the skull of *Manis* and those of *Epoicotherium* and *Xenocranium.* Such similarities are to be seen especially in the shape of the skull—the expanded, smooth cranium in *Manis,* the weak zygomatic arches, in the case of *Manis* carried to an extreme stage of reduction, the low, centrally placed orbit. In two particulars *Manis* shows specializations similar to those of the Epoicotheriidae and not seen in other mammals with which comparisons have been made. In the first place, the pterygoids of *Manis* are continued back internal and contiguous to the bullae, in a manner very suggestive of the condition seen in *Epoicotherium.* Yet the differences to be seen in this backward prolongation in the two genera, notably the retention of hamular processes in *Manis* as against their complete loss in *Epoicotherium,* and the lack of fusion between the pterygoids and the bullae in the former genus, a character typical of the latter one, lead to the conclusion that these characters are independent developments in the two forms. Again, *Manis* shows a large sinus or hollow enclosure within the squamosal, a point of resemblance to *Xenocranium* not seen in any other form. But here again the development of this cavity is so different in the two forms—it is essentially an " internal " space in *Manis,* so that its presence is not reflected in the external form of the skull as it is in *Xenocranium*—that it shows quite unmistakably that we are dealing with a parallelism, not with a character denoting close genetic relationship.

Nevertheless the resemblances, some of them certainly of a rather basic sort, between the skull of *Manis* and the skulls of the Xenarthra and of the Palaeanodonta would seem to lend weight to the probability that the Pholidota may have had their ancestry near to or within that for the Palaeanodonta and the Xenartha. But again, as in the case of the general palaeanodont-xenarthran affinities, the connection must have been a very ancient one. The phylogenetic diagram published by Simpson in 1931 ex-

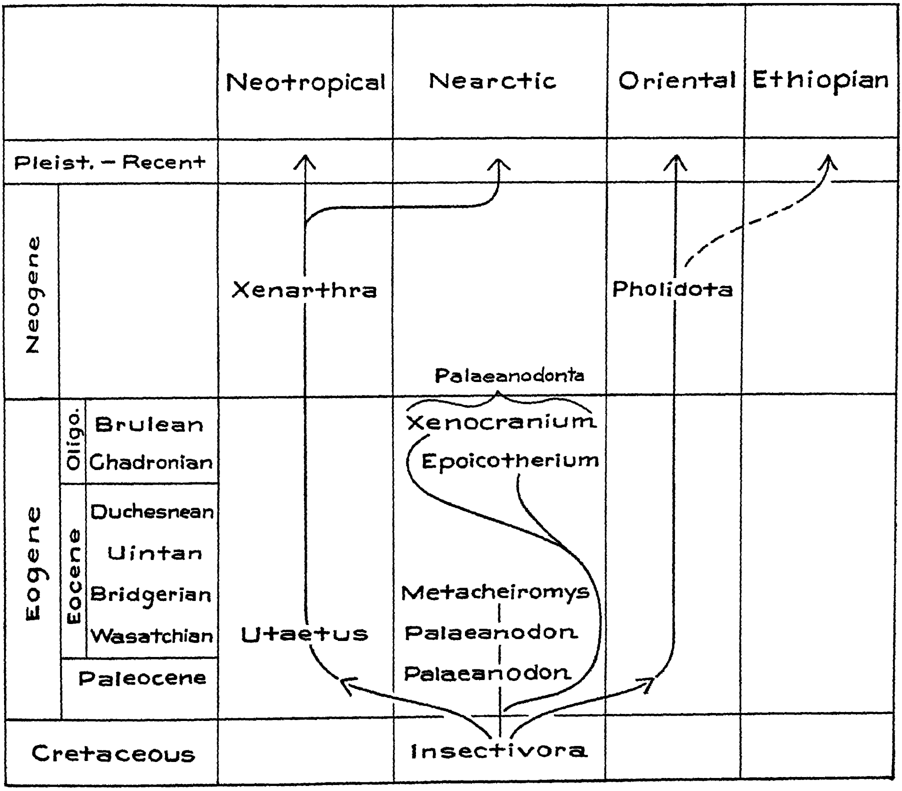


FIG. 3. Phylogenetic relationships of the Palaeanodonta, Xenarthra, and Pholidota.

presses very well the relationships discussed in the foregoing paragraphs, and upon the basis of it the following diagram is presented as a graphic summary of this discussion.

BIBLIOGRAPHY

ATKINSON, E 1871 On Some Points of Osteology of the Pichiciégo. Jour Anat. Phys, V, pp. 1-16, plate.

DOUGLASS, E. 1905. The Tertiary of Montana. Mem. Carnegie Mus, II, pp. 203-208, pl XXII, figs 13-16

GREGORY, W. K 1910 The Orders of Mammals Bull Amer. Mus Nat Hist, XXVII.

MATTHEW, W D. 1918 (in Matthew and Granger) A Revision of the Lower Eocene Wasatch and Wind River Faunas Bull. Amer. Mus Nat. Hist., XXXVIII, pp. 620-657

PARKER, W. K 1885 On the Structure and Development of the Mammalian Skull, II, Edentata Phil. Trans. Roy Soc, CLXXVI, pt 1, pp. 1-119

SCOTT, W B. 1941 (in Scott and Jepsen) The Mammalian Fauna of the White River Oligocene, Part V. Trans Amer Philos Soc, N S, XXVIII, pp. 955-959, pl C.

SIMPSON, GEORGE GAYLORD. 1927 A North American Oligocene Edentate. Ann Carnegie Mus, XVII, pp. 283-298.

——————. 1931. Metacheiromys and the Edentata Bull Amer. Mus. Nat. Hist., LIX, art. VI, pp 295-381.

SMITH, G ELLIOT 1899. The Brain in the Edentata. Trans Linn Soc London, (2 VII, pp. 277-394.

STOCK, CHESTER. 1925 Cenozoic Gravigrade Edentates of Western North America Carnegie Inst. Wash., Publ. no. 331

WEBER, MAX 1927 Die Saugetiere. 2nd ed. Jena.

WINDLE, B. G. and F. G PARSONS 1899. Myology of the Edentata Proc Zool. Soc London, 1899, pp 314-338, 990-1017

NOTULAE NATURAE

NUMBER 110 OF OCTOBER 29, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW SOUTH AFRICAN BIRD-LOCUST OF THE GENUS ANACRIDIUM (ORTHOPTERA, ACRIDIDAE, CYRTACANTHACRIDINAE)

BY JAMES A. G. REHN

Curator of Insects, The Academy of Natural Sciences of Philadelphia

The following very striking and distinctive species was encountered in determining certain series of South African bird-locusts. For various reasons it seems desirable to present its description now rather than await the completion of special reports now in preparation.

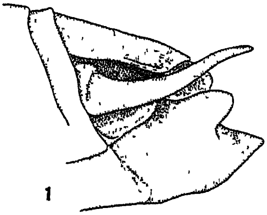
Anacridium incisum new species Figures 1, 2, 3, 4 and 9.

A relative of the broadly distributed *A. moestum* (Serville), but at once separable in the male sex by the more deeply divided and bilabiate disto-[illegible] portion of the subgenital plate, while in addition the same plate has the more proximal dorsal paired forceps-like processes shorter, deeper and blunter when seen in profile, in addition the cerci in the same view are more elongate. Other features of difference shared by both sexes are the narrower interantennal section of the frontal costa, the more deeply incised transverse sulci of the pronotum and its more deplanate metazonal dorsum, the less attenuate tegmina and wings, the former in particular proportionately broader while the apices of the same are narrower and sharper, the shallower and less cycloid genicular lobes of the caudal femora, the more general fuscous tessellate pattern which involves the cephalic limbs and strongly beads the caudal femoral margin yet lacks definite striatulae on the metazonal disk, in the almost complete absence of an alar fuscous band, which is but faintly indicated although the fuscous quadrations of the anterior field are almost as definite as in *A. moestum*, and in the definite yellowish green tinge of the alar disk. The accompanying figures of a male of *A. moestum moestum* (Figs. 5, 6, 7, 8 and 10) will, when compared with those of *A. incisum*, make clear the distinctive features of the latter.

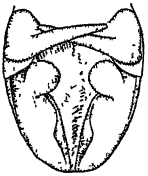
Type.— ♂, Kasouga,[1] Bathurst District, Cape Province, Union of South Africa. May, 1900. (Miss White.) [Academy of Natural Sciences of Philadelphia, Type no. 5644.]

---

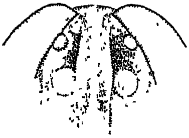
[1] Kasouga is the name of a section along the Kariega River about six miles (air-line distance) from the coast at the mouth of that river, and is about 15 miles S.W. of



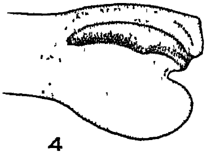
1



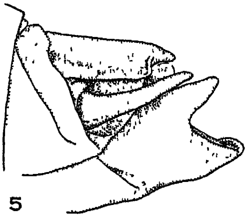
2



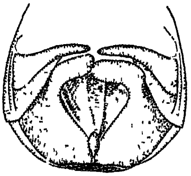
3



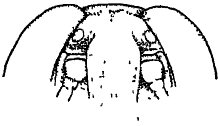
4



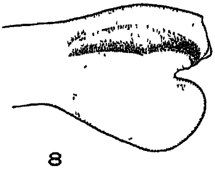
5



6



7



8

Anacridium incisum new species. Male (*type*). Kasouga, Cape Province, South Africa. Fig. 1.—Lateral view of apex of abdomen (enlarged). Fig. 2—Caudal aspect of same (enlarged). Fig. 3.—Cephalic view of dorsal section of frontal costa of head enlarged. Fig. 4.—Genicular lobe of caudal femur (greatly enlarged).

Anacridium moestum moestum (Serville). Male. Victoria West, Cape Province, South Africa. Fig. 5.—Lateral view of apex of abdomen (enlarged). Fig. 6—Caudal aspect of same (enlarged). Fig. 7.—Cephalic view of dorsal section of frontal costa of head (enlarged). Fig. 8.—Genicular lobe of caudal femur (greatly enlarged)

Size slightly smaller than in *A. m. moestum;* form as a whole appearing less elongate, but this is due to the proportionately shorter and less attenuate tegmina and wings.

Head very much as in *A. m. moestum*, as seen from dorsum with normally exposed length nearly equal to half of greatest width across eyes; fastigium with total width, i. e. across paired ocelli, as seen from dorsum, subequal to twice that of the interocular space at vertex, the width of the subexcavate medio-longitudinal section of the fastigial dorsum definitely narrower and less flaringly expanded laterad than in the male of *A. m. moestum*, being narrower than rather than subequal to the extreme interocular breadth; in profile the rounding of the fastigio-facial angle is seen to be more abrupt and less broadly arcuate than in *moestum*, facial line in same view straight and gently oblique, instead of weakly subarcuate as in *moestum;* frontal costa roughly subequal in width, much narrower than in *moestum*, no broader dorsad than the dorsal interocular space, rather than definitely broader as in *moestum*, the same section of the costa subequal in width to but no broader than the costa ventrad of the median ocellus (see Figs. 3 and 7), sulcation of costa about and ventrad of median ocellus much more decided and extensive than in *moestum:* eyes elliptical in basal outline, as seen in cephalic aspect slightly more elevated dorsad of the interocular area than in *moestum*. Antennae damaged in type.

Pronotum with the prozonal dorsum slightly more tectate, of the metazona more deplanate laterad, than in *A. m. moestum*, median carina slightly more marked; cephalic margin of pronotal dorsum definitely obtuse-produced, as a whole sharper than in *moestum*, caudal margin rounded obtuse as in *moestum*, prozona and metazona subequal in median length, transverse sulci quite deeply impressed, much more so than in *moestum*, the prozonal section in consequence with its divisions more lobiform: lateral lobes of the pronotum with proportions as in *moestum*, but ventro-caudal angle more narrowly rounded: surface of whole metazona and ventral portion of prozona of lateral lobes with scattered, slightly elevated, smooth nodose areas which are ivory-white in color.

Tegmina surpassing the apices of the caudal femora by a distance slightly less than twice the greatest pronotal length, in shape lanceolate, the greatest median breadth contained not over six times in the tegminal length, as against 6 6 in the male of *A m. moestum* figured in this paper, distal half of tegmen more sharply attenuate than in *moestum*, distal half of costal margin as a whole more evenly arcuate suturad than in *moestum*, the actual apex being virtually on the line of the nearly straight sutural margin, no equivalent of the short oblique distal subtruncation of *moestum* is clearly recognizable; venation similar to but more open than in *moestum*, the accessories fewer and the anastomosing more open. Wings shorter and relatively broader in the same ratio as the tegmina, the greatest breadth equal to but two and one-sixth times the wing length, instead of two and one-third as in the male of *moestum*, apex of wing less produced than in *moestum* and the peripheral margin of the disk slightly fuller (see illustrations).

Prosternal process definitely compressed, distal extremity very slightly bulbous, in profile straight oblique, but the apex by no means touching the mesosternum. Interspace between mesosternal lobes elongate rectangulate, narrow, breadth cephalad slightly less than that of one of the mesosternal lobes, contained about twice in the length of the interspace, caudal margin of mesosternal lobes oblique concave, meso-caudal angles acute. Metasternal lobes contiguous caudad of metasternal foveolae.

Supra-anal plate much as in *A. m. moestum* but slightly more elongate, its immediate apex more acute and its lateral margins less thickened proximad. Cerci more elongate than in *A. m. moestum* (compare Figs. 1 and 5), reaching to a point in axial length halfway between the apices of the supra-anal and subgenital plates, attenuation of distal section pronounced, as seen from dorsum more evenly and less sharply incurved in distal two-fifths. Subgenital plate with the medio-distal protuberance quite deeply divided vertically into a pair of vulviform lobes, which in profile are seen to be subacute-angulate, and viewed from the dorsum are somewhat thickened, while the same area in *A. m. moestum* is produced into a median, vertically lamellate, undivided, septum-like process, which ventrad is carinulate medio-longitudinally, faintly bulbose dorsad, and in profile is rounded acute-angulate at apex; proximo-dorsal paired forceps-like processes shorter, deeper and more bluntly rounded distad than in *A. m. moestum* (see Figs. 1, 2, 5 and 6), in caudal aspect these being seen to be less inbent and widely separated, instead of touching as in *moestum*.

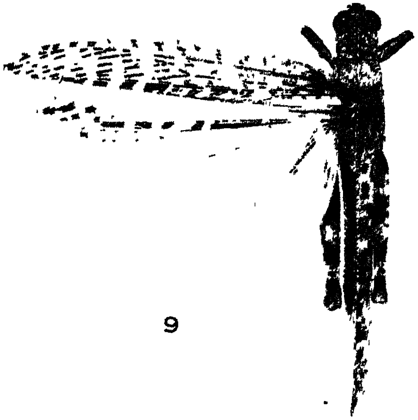
Limbs as a whole essentially as in *A. m. moestum*. Caudal femora with the spaced serrato-dentation of the dorsal margins, and particularly of the dorso-external and dorso-internal, more marked than in *A m. moestum*; genicular lobes shallower and less cycloid than in *moestum* (see Figs. 4 and 8): caudal tibiae with spines of both margins, but particularly those of the internal one, definitely shorter and stouter, external margin with 7 spines (the proximal one well spaced from the remainder of the series), the internal with 11.

Allotype.— ♀ ; same data as type. [The Academy of Natural Sciences of Philadelphia.]

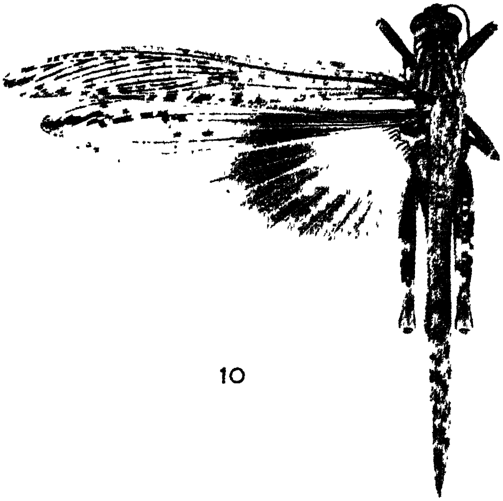
Differing from the preceding description of the male sex in the following noteworthy respects.

Size appreciably larger than in male; form and general proportions as in male.

Head with the width of the subexcavate medio-longitudinal section of the fastigial dorsum proportionately broader than in male, virtually equal to the extreme interocular breadth; in profile the fastigio-facial angle is slightly more rounded than in the male and the facial line is faintly arcuate; frontal costa proportioned as in male: eyes slightly less elevated dorsad of the interocular space than in the male. Antennae not quite twice as long as the pronotal dorsum.



9



10

Fig. 9.—*Anacridium incisum* new species. Male (*type*). Kasouga, Cape Province, South Africa. Dorsal view. (Natural size.)

Fig. 10.—*Anacridium moestum moestum* (Serville). Male. Victoria West, Cape Province, South Africa. Dorsal view (Natural size.)

Pronotum proportionately more robust than in male sex, cephalic and caudal margins of disk slightly less angulate.

Tegmina surpassing the apices of the caudal femora by but slightly more than one and one-half times the greatest pronotal length, slightly more attenuate than in the male sex, their greatest median width contained 6.25 times in the tegminal length, general outline otherwise as in male except that the distal arcuation of the costal margin is faintly less marked. Wings essentially as in male sex.

Mesosternal lobes with caudal margins less oblique, nearly transverse, hardly concave, interspace between lobes slightly broader proportionately. Metasternal lobes narrowly separated.

Supra-anal plate markedly compressed, in cross-section arcuato-tectate, in profile evenly declivent distad, its dorsal surface proximad definitely concavo-excavate with lateral margins of this area well elevated, then strongly declivent to the borders of the plate, surface distinctly divided in two by a transverse suture, this less evident dorsad than laterad, apex as seen from dorsum rounded obtuse-angulate. Cerci reaching to two-thirds the distance to apex of supra-anal plate, simple, tapering, acute, straight. Ovipositor valves relatively broad and short, dorsal surface of dorsal pair concavely excavate with lateral margins sharp and low cultriform, in profile the outline of these margins is strongly concave distad, the apices short recurved; ventral valves with decurving of apices not as sharp as the recurvature of dorsal pair, lateral plates very broad, broad acute at apices. Subgenital plate with distal margin trilobate, the median production markedly acute with subconcave converging margins, the lateral pair of productions short and subrectangulate with the intervening emarginations concavely rounded, middle line of ventral surface of subgenital plate sulcate for the distal two-thirds of its length.

Caudal tibiae with 8 to 9 external spines, internal margin with 11 as in male.

Coloration.—Pale base color of female light grape green (of Ridgway), on the tegmina as light as corydalis green (also of Ridgway), in male, probably by discoloration, between honey yellow and olive-ocher, the base tone of the abdomen in both sexes ochraceous-tawny; dark overlying tessellate pattern in both sexes mummy brown to fuscous. Head with dark tessellations margining the frontal costa and the accessory facial carinae, forming a pair of dorsal occipital lines and speckling the genae; eyes buckthorn brown (female) or speckled mummy brown (male); antennae (missing in male) uniformly of the pale base color. Pronotum with the prozona heavily speckled with subquadrate areas of the darker color; metazona pale, lacking the dark dorsal striatulae of *A. m. moestum*, scattered low nodose areas of the metazona and ventral portion of the prozonal portion of the lateral lobes creamy white. Tegmina quite heavily and thickly tessellate with the darker color (see Fig. 9). Wings with disk rather slightly washed with citron green, stronger in the male than in the female, band very faint, narrow and not joining the taenial bar, which is a series of mummy brown quadrations or sublineations as marked and contrasted as in *A. m. moestum*, in emphasis entirely independent of the strength of the discal band. Nearly all parts of the limbs markedly tessellate with mummy brown to fuscous, the cephalic and median tibiae in the female less definitely so than in the male; dorsal surface of caudal femora in both sexes definitely trifasciate transversely with fuscous in addition to a similar darkening of the supragenicular surface, all dorsal and lateral carinae strongly beaded with the darker color, external paginae pale with a few weak small darker punctae, pale genicular lobes bounded proximad by a vertical fuscous bar connecting with the dorsal infuscation; caudal tibiae fuscous tessellate, the spines pale proximad passing to reddish and fuscous tipped. Supra-anal plate in both sexes largely fuscous, ovipositor valves with margins fuscous lined.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur
♂, *type*	45.5	10.1	46.5	23 5
♀, *allotype*	54 5	12.2	56.5	28.2

I have seen only the type and allotype of this exceedingly well-marked species.

Whether *A. incisum* occurs in the same immediate territory as *A. moestum*, or is complementary to the latter and replaces it in a part of the Cape Province, remains to be determined.

NOTULAE NATURAE

NUMBER 111 OF NOVEMBER 12, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON A STRANDED PIGMY SPERM WHALE (KOGIA BREVICEPS)

BY ROBERT K. ENDERS
Swarthmore College

Notes on *Kogia* are not many, for the Pigmy Sperm Whale is not reported very frequently nor are the specimens in fair condition when found. Hirasaka[1] lists all reports available to him at the time of writing from the original description of De Blainville (1837 [1838]) a hundred years before 1937, saying, "...there are about fifty individuals...recorded by naturalists as *Kogia*, and they are distributed very widely over the world" (p. 119). Ulmer[2] gives the pertinent data concerning two more strandings of this interesting whale. The fact that approximately fifty had been reported in one hundred years has led to the belief that *Kogia breviceps* is rare. Allen[3] appeared after this paper was written: the records of Hale[4] and Ulmer[2] should be added to Allen's complete list of records.

On the other hand this whale may not be as rare as this record seems to indicate, for the small size may lead the untrained observer to believe that the animal is a shark or a porpoise, and so fail to identify it as a whale. The habit of keeping out of off-shore waters makes stranding, and hence identification by trained observers, unlikely. For example, the men who were employed in the porpoise fishery at Cape Hatteras, North Carolina, had every opportunity to become familiar with the bottlenose porpoise, *Tursiops truncatus*, for which they netted during the winter, and with the fauna off Diamond Shoals to which they guided groups of fishermen during

---

[1] Hirasaka, Kyosuke. 1937. On the pigmy sperm whale, *Kogia breviceps* (Blainville). Mem. Faculty Sci. & Agri. Taihoku Imp. University, Formosa, vol. 14, pp. 117-142.

[2] Ulmer, Jr., Frederick A. 1941. Kogia breviceps in South Carolina and New Jersey. Jour. Mammal., vol. 22, pp. 450-451.

[3] Allen, Glover M. 1941. Pygmy Sperm Whale in the Atlantic. Field Mus. Nat. Hist., Zool. Ser., vol. 27, pp. 17-36.

[4] Hale, Herbert M. 1939. Rare whales in South Australia. So. Australian Naturalist, vol. 19, pp. 5-8.

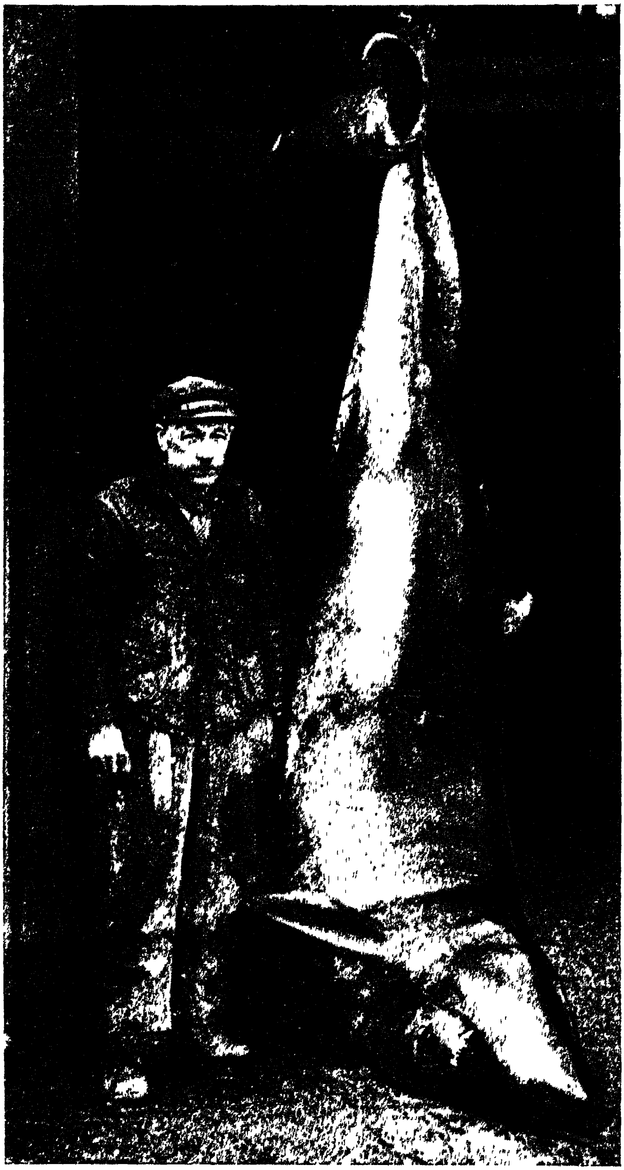


FIG. 1.—Pigmy Sperm Whale at Longport, N. J.

the other months. Yet they tell of an animal which they call a "shark" which they see about Diamond Shoals and waters farther off-shore. These observers describe this animal as a shark, pointing out the ventral location of the mouth, the size and sharpness of the teeth, and then add that the tail is unlike a shark, being horizontal in position, just like a whale or a porpoise, and that the animal comes to the surface to breath. These observations have been made while the animal is in the water since they have never taken any specimens in their sweep seines nor do the whales enter their set nets.

If this whale frequented in-shore waters where much of the porpoise fishing was done it is likely that some specimens would have been taken. A specimen from Oregon Inlet (Hobbs[5]; True[6]) confirms the presence of *Kogia* in these waters as do records for the coast of South Carolina (Tompkins[7]; Ulmer[8]; Allen[9]). The fishermen of Hatteras report *Kogia*, if this is *Kogia*, to be neither common nor rare.

On March 15, 1939, through the kindness of R. Dale Benson, Jr., the Academy of Natural Sciences of Philadelphia secured an intact specimen of *Kogia breviceps*. This animal came ashore at Longport, south of Atlantic City, New Jersey. Unfortunately the animal had been dead for some days before it was brought to the Martin Biological Laboratory, Swarthmore College. Because of lack of facilities, preservation of more than the head was out of the question. Lack of experience in dissection of such a large mammal is responsible for the briefness of these notes.

Dr. C. Brooke Worth, of Swarthmore College, and Dr. Herbert L. Ratcliffe, of the Philadelphia Zoological Society, aided in the dissection. The drawings were made by Eleanor Paxon. Dr. Ratcliffe sectioned various tissues of the animal and is publishing an article on the autopsy.[10]

The original report from Longport stated that the specimen was a lactating female, but on examination it proved to be an adult male in full

---

[5] Hobbs, James R. 1885. Stranding of a Pigmy sperm whale. Bull U. S. Fish Comm., vol. 5, p. 450.

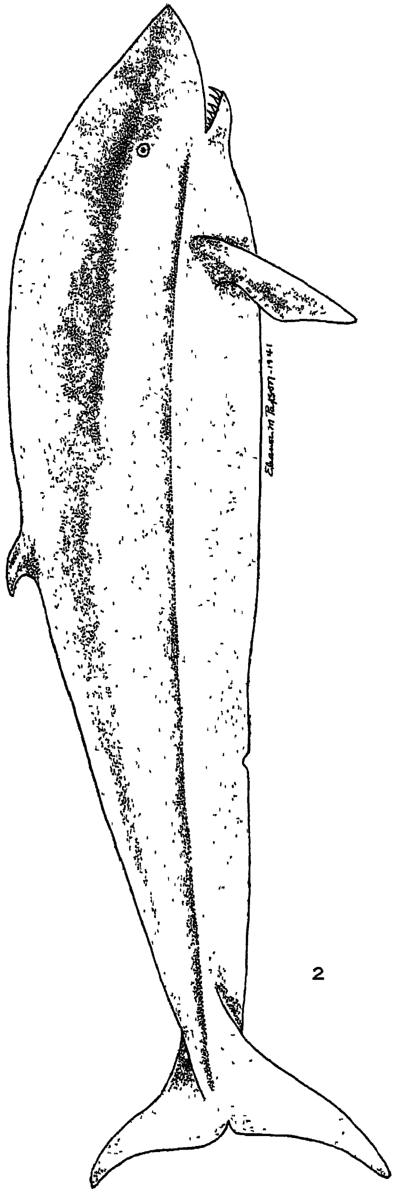
[6] True, Frederick W 1885. Notice of the capture of a male Pigmy sperm whale, Kogia breviceps, at Kitty Hawk, North Carolina Bull. U. S Fish Comm., vol 5, pp. 132-133.

[7] Tompkins, Ivan R. 1934. A pigmy sperm whale from the Savannah River entrance. Jour. Mammal., vol. 15, pp. 250-251

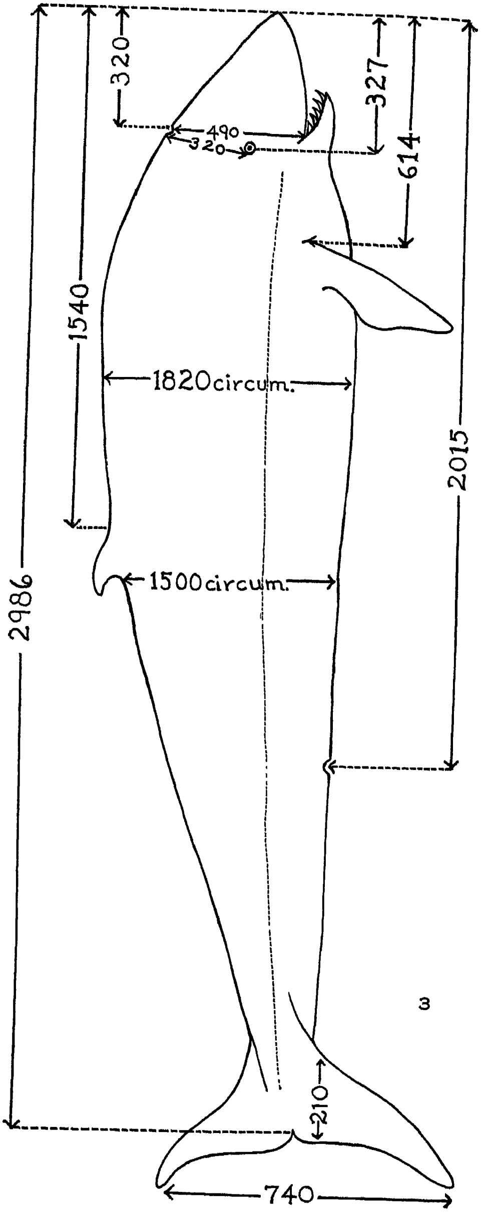
[8] Op. cit.

[9] Op. cit.

[10] Ratcliffe, Herbert L. 1942. Autopsy of a male Pigmy Sperm Whale (*Kogia breviceps*). Not. Naturae, no. 112.



2



3

FIG. 2—Outline drawing of Pigmy Sperm Whale

FIG. 3.—Outline of whale with measurements in centimeters.

spermatogenesis. The original report was based upon the large quantity of spermatic fluid escaping from the extruded penis being mistaken for milk. Checked microscopically the semen contained large numbers of sperms.

The complex stomach was empty except for many nematodes and a few beaks of cuttlefish. This is to be expected, for the animal lived for some time after stranding. The peritoneal cavity contained a large amount of bloody fluid that might have been an exudate released after the mammal grounded.

The size and weights of various organs and structures are listed in the accompanying diagrams and tables so no description will be undertaken.

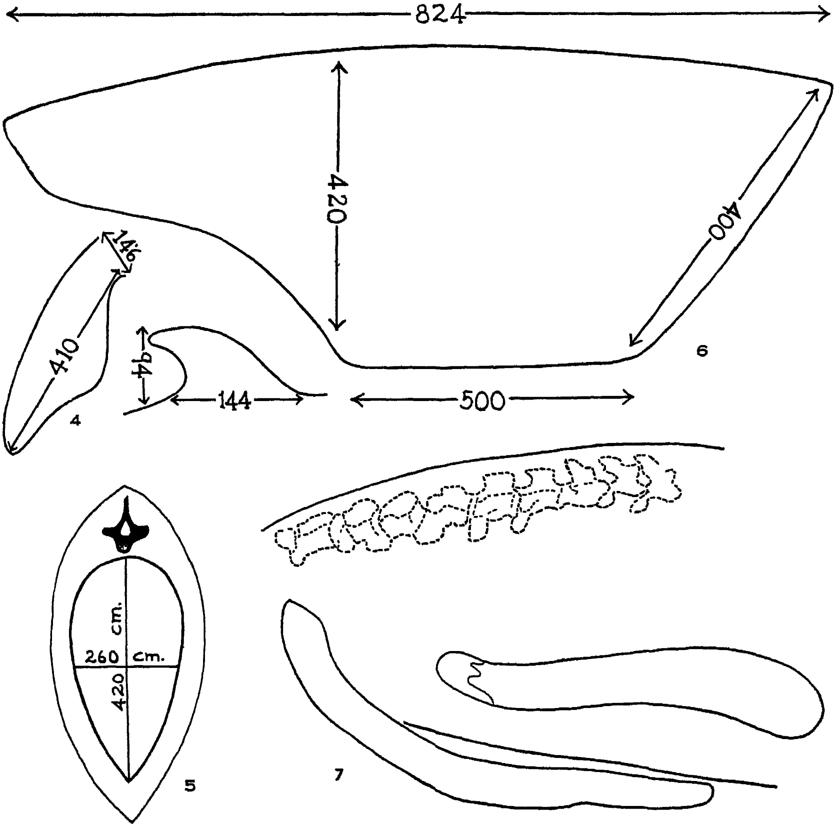


FIG. 4.—Outline of flipper and dorsal fin with measurements in centimeters. FIG. 5.—Diagrammatic cross-section through thoracic cavity. FIG. 6.—Outline of thoracic cavity, lateral aspect. FIG. 7.—Outline of testis and penis showing relative position.

The head was preserved intact for a study of the facial musculature and the mechanism of the blow hole.

Viscera

Liver	312 × 128 cm.
Intestine	36100 cm.
Penis	length—100 cm.
	diameter—Maximum 70 cm.
	diameter—Minimum 28 cm.
Weight	Total 417 kgs.
	Heart 1 360 kgs.
	Lungs Right—2.110 kgs.
	Left —1.790 kgs.

NOTULAE NATURAE

NUMBER 112 OF NOVEMBER 12, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

AUTOPSY OF A MALE PIGMY SPERM WHALE (KOGIA BREVICEPS)

BY HERBERT L. RATCLIFFE

Zoological Society of Philadelphia, and the Department of Pathology, University of Pennsylvania

Study of spontaneous disease of captive wild animals naturally leads one to speculate concerning their probable susceptibilities in their native environment. Hence, an opportunity to examine the body of a stranded pigmy sperm whale was welcomed even though this animal is not likely to be maintained in captivity.

The circumstances by which the subject of this report came to be obtained for examination have been described in the preceding paper by Dr. Enders.[1] The purpose of this note is the description of evidences of spontaneous disease found in the animal, especially the condition that seemed to have been responsible for its death. Since an anatomical study was the primary consideration, my examination was limited to superficial structures and to organs of the abdominal cavity. Later, a segment of the thoracic aorta was obtained for microscopic examination.

The body seemed to be well nourished. Within the subcutaneous fat of the belly wall numbers of cestode larvae were disclosed by the mid-line incision. Muscles had the usual dark red-brown color of marine mammals, but nothing abnormal was noted. Peritoneal surfaces were similar in color to the muscles, and all blood vessels of the abdominal cavity were distended.

The liver also was extremely dark red-brown, and congested, fluid blood pouring from cuts in its parenchyma. Scattered through the organ were small irregular dark foci, softer than the surrounding tissue and suggesting hemorrhagic necroses.

The spleen was not identified grossly with certainty, but a small soft dark red-brown mass of tissue, about 1 centimeter in diameter, lay in the position normal for the spleen. Sections proved it to be splenic tissue. It presented no gross abnormalities except congestion.

---

[1] Enders, Robert K., Notes on a stranded Pigmy sperm whale (Kogia breviceps). Not. Naturae, no. 111, 1942.

The kidneys also were congested, soft and moderately swollen, the cut surfaces bulging as if under tension. The ureters, bladder, testes and other elements of the genito-urinary apparatus were not abnormal.

The wall of the stomach and intestines was injected and probably discolored by the degeneration products of hemoglobin, being dark red-purple in color. The mucosa of the stomach also was dark red-purple, with considerable numbers of nematode worms rather firmly attached, some having about one third of the body buried in the tissue. Dark red mucinous fluid, in which were suspended many beaks of cuttlefish (?) and large numbers of nematodes 1.5 to 5 centimeters in length, moderately filled the stomach.

The small intestine also contained this fluid with worms and beaks of cuttlefish suspended in it, but was not appreciably distended although an obstruction had developed in the distal part of this segment. The exact level of this obstruction was not determined, but a mass of firm, friable dark brown material expanded and blocked a section of the gut some 20 centimeters in length. The wall over this was thin and easily torn. How this mass came to accumulate could not be decided. At least there was no evidence of twisting, interference with blood supply, or of inflammatory change in the gut wall. Nearby, however, were several small, elongate, transversely arranged calcified areas within the wall of the intestine. The lower parts of the bowel were not diseased.

Various tissues were fixed in formalin solution and prepared for microscopic study by standard methods. Morbid changes found in these seem to justify brief description since some of them permit an opinion on the cause of death of the animal.

Within the liver the greater part of each lobule was destroyed by expansion of the central veins and adjacent capillaries. These spaces were filled by erythrocytes among which scattered remnants of vascular channels and hepatic cells might be recognized. Relatively few central areas of the lobules contained intact blood vessels. Throughout the sections these congested and hemorrhagic foci made up more than three fourths of the organ, forming an irregular network. The peripheral parts of the lobules appeared as isolated areas of pale-staining, vacuolated cells, the nuclei of which were not appreciably abnormal. Here and there in the liver larger areas of hemorrhage had occurred. In these, all parts of several lobules were destroyed, forming irregular areas of necrosis. These were the softer, darker areas seen grossly. In occasional branches of the portal veins, small masses of antemortem blood clot were found but none of these obstructed the vessel.

The mass of splenic tissue also was intensely congested with hemorrhagic foci in some areas. The lymphoid tissue was scanty, corresponding to that seen in the spleen of senile animals. The walls of the smaller arteries often were relatively acellular, being reduced to masses of smoothly eosinophilic material restricting the lumina. Nuclei were limited often to the outer part of the wall and to the endothelial lining. Scattered through the congested red pulp of the spleen were large cells that corresponded in morphology to megakaryocytes, and occasional groups of other cells that suggested the precursors of erythrocytes. In addition a small focus of acute inflammation was found. Although this splenic mass was insignificant in relation to the size of the animal, it seemed to be a focus of blood-cell formation which may be in keeping with the supposedly greater blood volume of this type of mammal.

The histological appearance of the aorta seemed to be normal.

The kidneys presented nothing abnormal except for pronounced passive congestion of both cortex and medulla and autolytic changes in the cells of the convoluted tubules.

In the testis spermatogenesis seemed to be active, all stages in the formation of spermatozoa being found. Many stages of mitosis and many sperm were recognizable. In fact, considering the autolytic changes in other organs, the testes stained rather well, but also had been affected by autolysis. Interstitial cells were present in numbers comparable to the testes of other mammals.

Within the wall of the stomach and small intestine, veins and capillaries were widely distended with blood, apparently the result of slowed circulation. Superficial capillaries in the mucosa often had ruptured. Within the gastric mucosa, numerous small tubercle-like formations occurred at various levels. Apparently these were reactions to the attachment of the nematodes since some of them contained recognizable remnant of nematode tissue. Usually these areas were cup-shaped ulcers, the outer parts formed by a layer of hyaline material which was closely bordered by a zone of closely placed giant cells, epithelioid cells, monocytes, and eosinophilic polymorphonuclear leucocytes. Some few of these areas lacked the hyaline zone, however, and contained many neutrophilic leucocytes. None of these foci seemed to have been a source of hemorrhage into the gut.

The calcified areas in the wall of the small intestine lay in the muscular coats. These were simply areas in which calcium salts had been deposited, and were surrounded by hyaline connective tissue. There was no indication of the condition which led to this formation.

The nematodes found in the stomach of this animal have been identified with the genera *Anisakis* and *Porrocaecum*. Of these taken for study only the females seemed to be mature and these correspond in all essential features to *A. kogiae* and *P. kogiae,* described by Johnson and Mawson [2] from the stomach and intestine of pigmy sperm whales that stranded in two localities in Australia.

The cestode larvae taken for study proved to be valueless, the cysts being empty (sterile?) when examined. Probably they were *Phyllobothrium* larvae. These also were found by Johnson and Mawson [3], as well as by True [4] in this host.

I have not attempted an extended search for accounts of postmortem examinations of *Kogia breviceps,* but it may be noted that, in the four animals described in the two reports mentioned above, as well as in the present case, the cestode larvae in the subcutaneous tissues, and the nematodes and remains of cuttlefish in the stomach were constant features. Possibly cephalopods are intermediate host of these nematodes, rather than fish which were suggested by Baylis [5].

Death of this specimen may be attributed to circulatory collapse following intestinal obstruction. The composition of the obstruction was not determined. Possibly muscular tone of the gut was impaired, a suggestion supported by the occurrence of the calcified foci near the obstructed segment.

---

[2] Johnson, T. Harvey and Patricia M. Mawson. 1939. Internal Parasites of the pigmy sperm whale. Rec. So. Australian Mus., 6: 263-274.

[3] Op. cit.

[4] True, Frederick W. 1885. Notice of the capture of a male pigmy sperm whale, Kogia breviceps, at Kitty Hawk, North Carolina. Bull. U. S. Fish Commission, 5: 132-133.

[5] Baylis, H. A. 1916. Some ascarids in the British Museum (Natural History). Parasit., 8: 360-378.

NOTULAE NATURAE

NUMBER 113 OF NOVEMBER 20, 1942

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE PHLOXES OF NEVADA

BY EDGAR T. WHERRY

Research Fellow, Department of Botany, The Academy of Natural Sciences of Philadelphia

Continuing the study of the western representatives of the genus *Phlox* in successive states,[1] attention has now been directed to Nevada. Here two new entities have been recognized, and changes in status of several previously described have been found to be desirable. Investigation of the plants, both in the field and in western herbaria, was made possible by a grant in 1940 from the Penrose Fund of the American Philosophical Society.

TALL, SHRUBBY-BASED, SHORT-STYLED GROUP

1. **Phlox speciosa occidentalis** (Durand) Wherry[2]

No representative of this group has been recorded in Nevada heretofore. The subspecies of *P. speciosa* which extends down the Sierras, characterized by thickish short-acuminate leaves, is now known to grow 9 miles southeast of Red Rock, Washoe County, north latitude 39° 47′, west longitude 119° 55′.

TALL, SHRUBBY-BASED, LONG-STYLED GROUP

The members of this group are closely related and show more or less intergradation, so could all be classed as belonging to a single species. Since, however, the most widespread and earliest named, *P. longifolia*, has already been subdivided into 7 subspecies, it is more convenient to keep the more dissimilar members as distinct species.

---

[1] The Phloxes of Oregon, Proc. Acad. Nat. Sci. Phila., 90: 133, 1938; The Phloxes of Idaho, Not. Nat., no. 87: 1, 1941; and Phlox, in Flowering Plants and Ferns of Arizona, by Kearney and Peebles, p. 712, 1942. Field study carried out since the manuscript of the last was prepared has led to certain changes of interpretation, which are discussed in the present paper.

[2] Proc. Acad. Nat. Sci. Phila., 90: 133, 1938. Trinomials signify subspecies. Several of the latter have been reduced to varietal status by Peck, Madrono, 6: 135, 1941.

Key to the *Phlox longifolia* Group

COROLLA-TUBE 11 to 18 mm. long.
  INTERCOSTAL MEMBRANES OF CALYX flat or wrinkly........2. *P. viscida.*
  INTERCOSTAL MEMBRANES OF CALYX carinate.
    LEAVES thinnish, linear to lanceolate, long-acuminate; range chiefly northern ....3. *P. longifolia.*
    LEAVES thickish, short-lanceolate to ovate, short-acuminate; range chiefly southern ....4. *P. grayi.*
COROLLA-TUBE 20 to 33 mm. long..................5. *P. stansburyi;* ssp.:
  TUBE-LENGTH 20 to 25 mm.; Calif. to N. M. ....a. *custansburyi.*
  TUBE-LENGTH 26 to 33 mm.; Nev. and adj. Calif. ....b. *superba.*

2. **Phlox viscida** E. Nelson[3]

Developed chiefly in eastern Washington and Oregon, this entity appears sporadically farther south, and is known at one station in Nevada, Lower Rochester, Pershing County (40-17, 118-11).

3. **Phlox longifolia** Nuttall

All seven of the subspecies of this widespread *Phlox* recognized in Idaho[4] are known in Nevada as well. Entering from the north or northeast, they reach the following approximate latitudes:

humilis (Dougl. ex Hook.) W., 41-30; *typica* W., 40-00; *calva* W., *cortezana* (A. Nels.) W., and *viridis* (E. Nels.) W., 39-20; *compacta* (Brand) W., and *longipes* (Jones) W., 35-58, the last two occurring scattered throughout.

4. **Phlox grayi** Wooton and Standley[5]

When preparing the manuscript of the treatment of *Phlox* for Kearney and Peebles' Plants of Arizona in 1939, the writer placed *P. grayi* in synonymy under *P. amabilis*, but subsequent field study suggests the possibility of separating them. Only the present one occurs in Nevada; it is characterized by tendencies toward lanceolate-ovate leaves, carinate calyx-membranes, and entire corolla-lobes (the Arizonian *P. amabilis* having these structures respectively oblong, flat, and notched).

---

[3] Rev. W. N. Am. Phlox: 24, 1899.

[4] Not. Nat., no. 87: 4, 1941.

[5] *P. longifolia* var. *Stansburyi* f. *brevifolia* Gray, Proc. Amer. Acad. Arts Sci., 8: 255, 1870; *P. l.* var. *S.* subvar. *b.* Gray ex Watson, Bot. U. S. Geol. Expl. 40 Par., 5: 261, 1871; *P. l.* var. *b.* Gray, Syn. Fl. N. A., 2(1): 133, 1878; *P. S* var. *b.* E. Nelson, Rev. W. N. A. Phlox: 27, 1899; *P. S.* ssp. *eu-Stansburyi* var. *b.* Brand in Engler's Pflanzenreich, IV. 250: 66, 1907; *P. amabilis* in part, Brand, ibid., p. 74; *P. grayi* Wooton and Standley, Contr. U. S. Nat. Herb., 16: 161, 1913; *P. visenda* A. Nelson, Am. J. Bot., 18: 434, 1931.

How difficult this *Phlox* has proved for taxonomists to classify is shown by the size of the list of successive treatments in footnote 5. Gray originally granted it only the status of form, but then changed his mind twice, ultimately dissociating it from *P. stansburyi*, which it indeed scarcely resembles. Nevertheless both E. Nelson and Brand endeavored to return it to that species.

That the entity in question deserves species status was urged by Wooton and Standley (*loc. cit.*) in the words "This plant is distinct enough from both *P. longifolia* and *P. stansburyi* to receive specific rank; in fact it is much more distinct from those species than are most of the members of the genus from each other." They overlooked Brand's proposal of *P. amabilis* (which is in part the same entity) and were in turn overlooked by A. Nelson when he proposed *P. visenda.*

Since intermediates between this and other entities are actually occasionally met with, the writer long hesitated to adopt this view, and annotated sheets in several herbaria as representing either *P. amabilis* or *P. longifolia.* Independent species status is now accepted, for simplicity.

In the course of their rearrangement of the epithets, none of the authors cited in footnote 5 seems to have thought of designating a type specimen for the original plant. As lectotype is here suggested a sheet from Carson City, Nevada, *C. L. Anderson* 76, 1865, in Gray Herbarium, annotated by Gray "forma *brevifolia.*"

Southern in range, *Phlox grayi* extends from southeastern California to westernmost New Mexico, and north in Nevada to Lamance Creek, Humboldt County (41-31, 117-35).

5. **Phlox stansburyi** (Torrey) Heller[6]

First proposed, with a question, as a variety of *P. speciosa*, this entity has ultimately come to be classed as an independent species, although opinion as to what constitutes its chief diagnostic character varies widely from one worker to another. The only significant feature which the present writer has been able to recognize from study of the type specimen—taken to be the plant on the left side of the sheet in the Britton Herbarium, from "Gravelly hills near the Organ Mountains, New Mexico" *Bigelow* 4/30/'52—consists in the elongate corolla-tube. The range in tube-length shown is regarded as justifying the segregation of two subspecies.

---

[6] *P. speciosa* var. ? *Stansburyi* Torrey, Bot. Mex. Bound. Surv., 2(1): 145, 1858; *P. longifolia* var. *S.* Gray, Proc. Amer. Acad. Arts Sci., 8: 255, 1870; *P. S.* Heller, Bull. Torr. Bot. Club, 24: 478, 1897. Decapitalization of all species names, irrespective of their source, is here favored.

5a. **Phlox stansburyi eustansburyi** Brand[7]

The type of *P. stansburyi* has the corolla-tube 22 to 23 mm. long, which is adopted as the average value for the typical subspecies, the overall range of variation being 20 to 25 mm.

Plants showing these values range from California to New Mexico, in Nevada extending north to Ferguson Spring, Elko County (40-27, 114-11), and northwest to Candelaria, Mineral County (38-09, 118-05).

5b. **Phlox stansburyi superba** (Brand) Wherry[8]

In describing his *P. superba,* Brand gave data from which it may be calculated that the corolla-tube is 27 mm. long. He failed to designate a type specimen, so as lectotype may be taken the collection he cited first, Tonopah, Nevada, *Mrs. Hugh Brown,* April 30, 1905, in herbarium California Academy of Sciences (rendered by Brand "Jonopah" and "Mai."). This sheet bears portions of three individuals with tubes respectively 22, 26, and 28 mm. long, both subspecies being thus represented. The last-mentioned value is shown by the largest fragment, which judging from Brand's description was the one on which he based the species epithet. The total range in tube length observed on collections seen is 26 to 33, average 30 mm.

This subspecies is endemic in Nevada and adjacent California, reaching a northern limit at Currant, Nye County (38-45, 115-30), and a southern in the Pahranagat Mountains, Lincoln County (37-20, 115-20). It sometimes grows in sageland on rocky slopes, along with the typical subspecies, but may occur in pure stands.

---

[7] *P. Stansburyi* ssp. *eu-Stansburyi* Brand in Engler's Pflanzenreich, IV. 250: 66, 1907; such epithets are here simplified. Besides the typical form, of which the average height is 20 cm. and maximum leaf-width 4 mm., there is: forma **longituba** (Heller) Wherry, stat. nov.; *P. longituba* Heller, Muhlenbergia, 2: 228, 1906. This averages 30 cm. in height and 6 mm in maximum leaf-width, but has the same range in corolla-tube length as the typical form, so does not deserve higher status.

[8] *P. stansburyi* **superba** (Brand) Wherry, stat. nov. *P superba* Brand in Engler's Pflanzenreich, IV. 250: 67, 1907. This differs from ssp. *eustansburyi* in having a relatively long corolla-tube, and in occupying a restricted range.

In this connection discussion is required of *P. dolichantha* Gray, Proc. Amer. Acad. Arts Sci., 22: 310, 1887. He furnished a description of a southern California plant with the corolla-tube "sesquipollicaris" or 36 mm. long, citing two collections, *Parry & Lemmon* 1876 and *Parish* June 1886. At the same time he mistakenly cited also a Nevada specimen, *Searls* 1871, which shows a 31 mm corolla-tube and actually represents what is here classed as *P. stansburyi superba* Munz and Johnston, Bull Torr. Bot. Club, 49: 356, 1922, have urged that the epithet *dolichantha* belongs to the Nevada plant, and named the California one *P. bernardina.* The present writer holds, on the other hand, that when two entities are covered by citations, the epithet concerned should be assigned to the one corresponding to the accompanying description, whereby the California entity becomes *P. dolichantha.*

DWARF-SHRUBBY, MEDIUM-LEAVED GROUP

6. **Phlox gladiformis** (Jones) E. Nelson[9]

The typical form of *P. gladiformis*, which came from southwestern Utah, has clumps 6 to 12 cm. high, pedicels 0.5 to 2 mm., and corolla-tube 10 to 15 mm. long. The entity from Nevada named *P. gooddingii* shows the respective values 8 to 15 cm., 2 to 5 mm., and 9 to 12 mm. These differences are but slight, and as the material is the same in all other respects, having in particular one feature unique among the dwarf-shrubby Phloxes—glandular pubescence not only on the herbage but also on the corolla-tube—only form distinctness is accepted here.

P. gladiformis is endemic in a small area in southwestern Utah, adjacent Nevada, and possibly northwestern Arizona. The only known occurrence in the present state is: Mormon Mountains, Lincoln County (37-00, 114-25), *Kennedy & Goodding* 103, May or July, 1903.

7. **Phlox kelseyi salina** (Jones) Wherry[10]

In assigning this entity to subordinate status under *P. douglasii*, Jones used the latter name in the comprehensive sense customary in his day. It belongs, however, to *P. kelseyi*, agreeing with the typical subspecies of that in succulent herbage becoming wrinkled in drying, obscurely costate sepals, narrow intercostal calyx-membranes, and eglandular hairs. Differences comprise the very sparse pubescence—often limited to a few cilia—and relatively small leaves—at most 15 mm. long by 2 mm. wide—and the somewhat smaller flowers of the present entity. Since it occupies a disjunct area far to the southwest of the principal range of the species, it is here made an independent subspecies.

The type and only known locality of this *Phlox* is a saline marsh 9 miles southeast of the village of Cherry Creek, White Pine County (39-48, 114-48). This lies nearly 300 miles from the nearest locality of ssp. *genuina* near Soda Springs, Idaho.

---

[9] *P. longifolia* var. *gladiformis* M. E. Jones, Proc. Calif. Acad. Sci., (2) 5: 711, 1895; *P. g.* E. Nelson, Rev. W. N. Am. Phlox: 21, 1899; this, the typical form, may be distinguished from the following two variants: *P. g.* forma **gooddingii** (Nels. & Kenn.) Wherry, stat. nov.; *P. Gooddingii* Nelson & Kennedy, Muhlenbergia, 3: 141, 1908. This, the Nevada representative, differs from the typical form in having slightly longer stems and pedicels. Second, *P. g.* forma **caesia** (Eastw.) W., stat. nov.; *P. caesia* Eastwood, Leafl. W. Botany, 2: 54, 1937. Here the leaves are relatively narrow and pedicels short; the plant grows around Bryce Canyon National Park, Utah.

[10] *P. kelseyi* **salina** (Jones) Wherry, stat. et comb. nov. *P. Douglasii* var. *salina* M. E. Jones, Contr. W. Botany, 13: 3, 1910.

8. **Phlox multiflora depressa** (E. Nelson) Wherry[11]

This chiefly Rocky Mountain entity has been collected in Nevada at Jarbidge, Elko County (41-52, 115-25). It is a glabrate plant with linear herbaceous (not rigid nor succulent) leaves and strongly costate sepals connected by broad flat membranes.

DWARF-SHRUBBY, GLANDULAR, SMALL-LEAVED GROUP

One species belonging to this group is the long-known, widespread *Phlox caespitosa*, three of the four subspecies of which occur in the higher mountains of Nevada. The segregate from this named *P. covillei* has been regarded by some workers to be only varietally distinct, but may well be retained as an independent species.

Key to the *Phlox caespitosa* Group

LEAVES flat to subconcave, the margins slightly thickened, superficially glabrous to pilose, marginally coarse-ciliate, up to 12 mm. long; styles 3 to 6 mm. long; widespread in w. U. S. ......9. *P. caespitosa;* ssp.:
  HABIT cespitose, the height averaging 8 cm., the nodes somewhat spaced; leaf-width under 2 mm. ....a. *eucaespitosa.*
  HABIT pulvinate, the height averaging 4 cm. and the nodes crowded.
    LEAF-WIDTH up to 2 or even 3 mm. ....b. *platyphylla.*
    LEAF-WIDTH up to 1.5 or rarely 2 mm. ....c. *pulvinata.*
LEAVES concave, the margins markedly thickened, superficially pilose to hirsute, marginally dense-ciliate, up to 7 mm. long and 2 mm. wide; styles 2 to 3 mm. long ....10. *P. covillei.*

9a. **Phlox caespitosa eucaespitosa** Brand[12]

Some collections seen from Mt. Rose, Washoe County (39-21, 119-55) and Deeth, Elko County (41-05, 115-05) are tall enough to be classed here.

9b. **Phlox caespitosa platyphylla** Wherry[13]

Among the material of *Phlox grayi* in the Gray Herbarium labelled as collected around Carson City, Ormsby County, by Anderson in 1865 there is a plant of this entity. As this is chiefly more northern in range, the record is doubtful.

---

[11] *P. multiflora* var. *depressa* E. Nelson, Rev. W. N. Am. Phlox: 20, 1899; *P. depressa* (E. Nels.) Rydberg, Bull. Torr. Bot. Club, 33: 149, 1906; *P. multiflora depressa* (E. Nels.) W., Not. Nat., no. 87: 12, 1941. (In the writer's key, the final word on the first line should be not "*genuina*" but *typica.*)

[12] In Engler's Pflanzenreich, IV. 250: 83, 1907.

[13] Not. Nat., no. 87: 9, 1941.

9c. **Phlox caespitosa pulvinata** Wherry[14]

The widespread pulvinate, small-leaved subspecies has been collected in Nevada on Mt. Rose and neighboring peaks, Washoe County, in the Ruby Mountains, Elko County, and on Mt. Wheeler, White Pine County.

10. **Phlox covillei** E. Nelson[15]

The typical form of this species occurs at several stations in the Spring or Charleston Mountains, Clark County, from which it has been distributed to herbaria with printed labels bearing the name combination made by Brand: "*P. caespitosa* ssp. *muscoides* var. *covillei*." This represents an unfortunate misinterpretation by that monographer, in that *P. muscoides* Nuttall is an unrelated plant of the Wyoming plains.

In the preparation of his monograph on *Polemoniaceae*, Brand appears to have borrowed specimens from but one American herbarium, that of the California Academy of Sciences. Most of the sheets to which he attached annotation slips were subsequently destroyed, but the one which chanced to reach another herbarium and remain intact represents this case of confusion of entities. This annotation slip indicates that the plant on the sheet had been compared with the original *P. muscoides*, but Brand surely never saw the Nuttall specimen of the latter in the Gray Herbarium. Judging from it, *P. muscoides* lacks the coarse ciliation and glandularity of both *P. caespitosa* and *P. covillei*, being instead arachnoid tomentose and having thin subulate leaves less than 4 mm. long.

A reduced alpine form has been named *P. dejecta* Nelson and Kennedy. This was contrasted with the morphologically dissimilar and geographically remote *P. bryoides* and *P. muscoides*, its relationship to the more recently described *P. covillei* being overlooked, although the respective type localities were but a few miles apart. A change in status is therefore proposed here. All previous collections of *Phlox covillei* f. *dejecta*[16] have been made on the summit of Mt. Rose, but in 1940 it was found also on a nameless mountain a mile further southwest (39-20, 119-56) on bleak northeast-facing slopes at 10,000 feet altitude. Here were also seen intermediates between *P. covillei* and *P. caespitosa*, possibly representing hybrids.

---

[14] Not. Nat., no. 87: 10, 1941.

[15] Rev. W. N. Am. Phlox: 15, 1899. When described, the type was stated to be in the herbarium of the California Academy of Sciences. It was destroyed, however, by the fire of 1906, so as neotype I propose the specimen placed by Coville in the U. S. National Herbarium: *Coville and Funston* 1801, July 8, 1891. (No. 47971).

[16] *P. dejecta* Nelson & Kennedy, Proc. Biol. Soc. Wash., 19: 37, 1906; here made *P. covillei* E. Nelson f. **dejecta** (Nels. & Kenn.) Wherry status novus. Lower and smaller-leaved than the typical form.

DWARF-SHRUBBY, EGLANDULAR, SMALL-LEAVED GROUP

- INTERCOSTAL MEMBRANES of calyx flat to somewhat carinate.
  - LEAF-TEXTURE flaccid to moderately firm.
    - INTERNODES glabrous to pilose.
      - DECUMBENT STEMS well-developed; nodes often spaced; corolla-tube (7) 9 to 13 mm. long ....11. *P. diffusa;* ssp.:
        - CALYX-MEMBRANES flat to wrinkly.
          - LEAF-OUTLINE broad-subulate; largest leaves 10 to 15 by 1 to 1.5 mm. ....a. *typica.*
          - LEAF-OUTLINE narrow-subulate, the largest leaves 8 to 10 by 0.5 to 1 mm. ....b. *scleranthifolia.*
        - CALYX-MEMBRANES more or less carinate...........c. *subcarinata.*
      - DECUMBENT STEMS little-developed; nodes mostly crowded; corolla-tube 5 to 9 (11) mm. long.
        - LEAVES thinnish, narrow-subulate; pubescence fine, more or less tomentose ....12. *P. hoodii;* ssp.:
          - PRINCIPAL LEAVES about 9 mm., sepals 7.5 mm. and corolla-tube 9 mm. long ....a. *canescens.*
          - PRINCIPAL LEAVES about 6 mm., sepals 6 mm., and corolla-tube 7 mm. long ....b. *genuina.*
        - LEAVES thickish, linear-subulate, the principal ones 3 to 4 (5) mm. long; pubescence coarse and hispid ....13. *P. tumulosa.*
    - INTERNODES tomentose and inflorescence densely so......14. *P. lanata.*
  - LEAF-TEXTURE firm, the tips acerose; pubescence copious, hirsute; herbage gray-green ....15. *P. griscola.*
- INTERCOSTAL MEMBRANES of calyx strongly carinate; leaf-texture firm, the tips acerose; pubescence fine, soft, or none ....16. *P. austromontana;* ssp.:
  - STEMS long-decumbent; longest leaves 15 to 30 mm. long ....a. *prostrata.*
  - STEMS short-decumbent to erect, forming a compact clump.
    - LONGEST LEAVES 12 to 20 mm. long ....b. *vera.*
    - LONGEST LEAVES 8 to 12 mm. long ....c. *densa.*

11. **Phlox diffusa** Bentham[17]

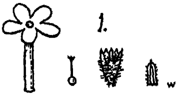
Three subspecies are known here. The Sierran ssp. *typica* extends into Washoe and Ormsby counties, its easternmost station being Summit Lake, long. 119-02. Ssp. *subcarinata* is scattered nearly throughout, there being records from Washoe, Humboldt, Nye, and Elko counties; its type locality was Mt. Rose, in the first-named. Ssp. *scleranthifolia,* in Washoe only.

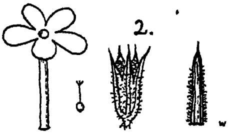
---

[17] Plantae Hartweg.: 325, 1849; ssp. *typica* Wherry, Proc. Acad. Nat Sci Phila., 90: 139, 1938; ssp. *subcarinata* W., J. Wash Acad Sci., 29: 517, 1939; ssp. *scleranthifolia* (Rydb.) W., Not. Nat., no. 87: 13, 1941.

12. **Phlox hoodii** Richardson [18]

Common in Nevada sagelands. The relatively large ssp. *canescens* is recorded from Washoe, Ormsby, Humboldt, Lander, Esmeralda, Elko, White Pine, and Clark counties. Its lesser relative, spp. *genuina*, is represented by specimens from Douglas, Mineral, Esmeralda, and White Pine.





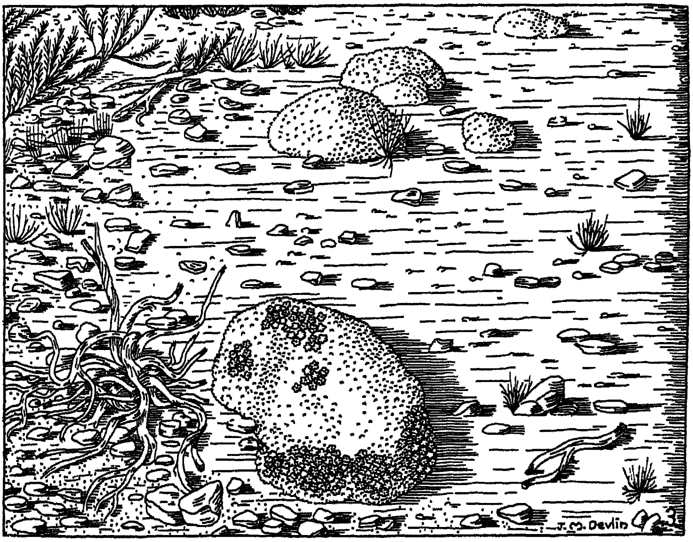


FIG. 1—Corolla, gynoecium, calyx, and leaf of *Phlox tumulosa*.
FIG. 2.—Same. of *Phlox griseola*. In both about natural size.
FIG. 3—*P. tumulosa* at the type locality; from a photograph.

13. **Phlox tumulosa** new species Figures 1 and 3.

In Kearney and Peebles' Plants of Arizona the writer included *Phlox covillei* with the remark that "the phase occurring in Arizona and eastern Nevada is wholly eglandular. Further study may show the latter to constitute a different subspecies." It is now being made a species instead.

---

[18] In Frankl. Narr. J. Polar Sea, App., 733, 1823; ssp. *genuina* W., Not. Nat., no. 87: 14, 1941; ssp. *canescens* (T & G.) W., Proc. Acad. Nat. Sci. Phila., 90: 139, 1938.

Habit pulvinate, in sandy places yielding mounds scores of centimeters across, with the living portion but 1 or 2 cm. thick; pubescence wholly eglandular; leaves crowded, small-oblong, mucronate, thick-margined and somewhat concave, up to 4 or rarely 5 mm. long by 1 mm. wide, pilose, especially on the inner surface; pedicels 0.5 to 1 mm. and sepals about 5 mm. long, densely pilose except toward sepal-tips; corolla-tube about 9 mm. long and white lobes 4.5 by 3 mm.; styles 2 to 4 mm. long.[19]

TYPE collected along truck road following electric power line to McGill, 4 miles northeast of Ruth and a like distance northwest of Ely, White Pine County, Nevada (39-18, 114-56); *Moore & Franklin* 131, 5/22/'37, in herbarium Academy Natural Sciences Philadelphia. Specimens have been seen also from Pioche, Lincoln County; Mt. Wheeler, White Pine County; and points respectively near, 7 miles northwest, and 12 miles northwest of Ragsdale Springs, a place lying about 7 miles north of Ely, White Pine County. The third of these points is the northern known limit of the species (39-30, 115-00); southward it extends to the desert around Beaverdam, in northwesternmost Arizona.

14. **Phlox lanata** Piper [20]

This endemic of southeastern Oregon and adjacent Idaho ranges also into Nevada, there being collections from Washoe, Elko, and White Pine counties. Its southern limit is in the last, at one of the places known as Warm Springs, the collector failing to designate which. It grades toward *P. hoodii canescens* and may not deserve more than subspecies status.

15. **Phlox griseola** new species Figure 2.

An entity growing in eastern Nevada and adjacent Utah, with the aspect of *Phlox austromontana densa*, differs from that sufficiently in pubescence and calyx-characters to justify its recognition as an independent species.

Plant compact, gray-green; leaves thickish with pale subcallous margins, linear-subulate and acerose, up to 12 mm. long and 1.5 mm. wide, superficially minute-pilose and marginally copiously coarse-ciliate, the hairs all eglandular; inflorescence 1-flowered, the pedicels 0.5 to 3 mm. long; sepals about 9 mm. long, united half their length, strongly costate, the intercostal membranes flat or barely carinate, pilose; corolla white to pale lilac, the tube about 12 mm. long and lobes 6 by 4 mm.; styles 2 to 4 mm. long.[21]

---

[19] *Phlox* **tumulosa** Wherry, species nova. Habitus pulvinatus, in loci arenosi tumulosus; folia oblonga, mucronata, crasso-marginata, ad 4 (5) mm. longa et 1 mm. lata, eglanduloso-pubescens; sepala circa 5 mm. longa, dense pilosa; corollae tubus circa 9 mm. longus; styli 2 ad 4 mm. longi.

[20] Bull. Torr. Bot. Club, 29: 643, 1902.

TYPE from Spring Valley, Lincoln County, Nevada (38-10, 114-10); *Train* 2622, 4/20/'39, in herbarium Academy Natural Sciences Philadelphia. Specimens have been seen also from Big Spring Canyon and Pioche, Lincoln County, Nevada, and from Beaver County, Utah.

16. **Phlox austromontana** Coville [22]

Three subspecies occur in Nevada. Ssp. *vera* extends throughout, there being records for Washoe, Ormsby, Humboldt, Mineral, Esmeralda, Elko, White Pine, and Lincoln counties. Ssp. *densa* is not known so far southwest, the county list being Storey, Humboldt, Nye, Elko, and White Pine. Ssp. *prostrata* appears to have been collected but once, near Deer Lodge, Lincoln County.

Excluded Species

P. dolichantha Gray. The Nevada collection cited by Gray when he described this southern California species is here regarded as representing *P. stansburyi superba* instead.

Several species attributed to Nevada in Tidestrom's Flora [23] are not included as such in the present list:

P. canescens T. & G. is recognized in the state, but is treated as a ssp. of *P. hoodii* Richn.

P. dejecta Nels. & Kenn. is considered a mere form of *P. covillei.*

P. douglasii was keyed out by Tidestrom as an eglandular plant, showing that he did not have at hand the entity so-named by Hooker. He evidently used the name for what is here classed as *P. diffusa* Benth., together with the newly named *P. griseola.*

P. gooddingii Nels. & Kenn. is here classed as a form of *P. gladiformis.*

P. rigida Benth. (= *P. douglasii rigida* (Benth) W.) grows in Oregon and Idaho, and may conceivably enter Nevada, but I have seen no specimens from this state.

---

[21] *Phlox* **griseola** Wherry, species nova. Planta compacta, griseola; folia crassiuscula, lineari-subulata et acerosa, ad 12 mm. longa et 1.5 mm. lata, dense egladuloso-ciliata; sepala circa 9 mm. longa, valde costata, membranis intercostalibus planis vel obscure-carinatis; corollae tubus circa 12 mm. longus; styli 2 ad 4 mm. longi.

[22] Contr. U. S. Nat. Herb., 4: 151, 1893; ssp. *vera* Wherry, *prostrata* (E. Nels.) W., and *densa* (Brand) W., J. Wash. Acad Sci., 29: 518, 1939.

[23] Contr. U. S. Nat. Herb., 25: 426, 1925

NOTULAE NATURAE

NUMBER 114 OF JANUARY 28, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTION OF A NEW COPSYCHUS FROM THE BATU ISLANDS[1]

BY S. DILLON RIPLEY

United States National Museum

During the course of recent studies on the birds of the west Sumatra islands I have had occasion to compare critically the several populations of *Copsychus saularis* found on the archipelago off the west coast of Sumatra. Among all these islands there is one population which remains unnamed. For it I propose the following name:

Copsychus saularis masculus new subspecies

TYPE.—ad. ♀, ANSP no. 56670, collected on Tana Massa I., Batu Is., Sept. 26, 1896, by J. Z. Kannegieter.

Description.—This race differs from *s. musicus* of Sumatra and the Malay Peninsula primarily in the females which show a tendency towards larger size and are darker, more glossy blue-black on the upper parts, more blackish gray on the throat and breast. The males are slightly larger on the average than males of *s. musicus* but otherwise indistinguishable.

From *s. nesiarchus* of Nias this race differs by having less white on the third and fourth rectrices. From *s. pagiensis* of the Pagi Islands, this race differs by smaller size, and in the female slightly paler throat and breast.

Measurements of type.—Wing 105.5 mm., tail 92, culmen 21. Males and another female measure: wing 105-108.5. Measurements of *s. musicus:* wing, ♂ 100-106.5 (102.6), ♀ 93–99 (97.5); *s. pagiensis:* wing ♂ 119.5, ♀ 109.5, 111.5.

Range.—Batu Islands; Pini, Tello, Tana Massa.

---

[1] Published with the permission of the Secretary of the Smithsonian Institution.

NOTULAE NATURAE

NUMBER 115 OF MARCH 26, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTION OF A NEW GOBY FROM THE FIJI ISLANDS

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

My valued correspondent, Mr. R. A. Lever, Government Entomologist at Suva, sent to me for identification the two little gobies which I describe below which appear to be a new species of *Vaimosa.* I wish therefore to dedicate the species to him. He visited the type locality for this interesting fish since the types were secured and writes me that he was unsuccessful in trying to obtain additional specimens.

Vaimosa leveri new species Figures 1 (predorsal from above), 2 (lateral view), and 3 (preanal from below)

Depth $4\frac{1}{2}$ to $4\frac{3}{5}$; head $3\frac{2}{5}$, width $1\frac{7}{8}$ to 2. Snout (in profile) with length 2 to $2\frac{1}{3}$ in eye, short, broad, greatly inclined and tip level with lower edge of eye; eye 3 to $3\frac{1}{10}$, close to and invading upper profile of head; mouth broad, with short cleft; closed jaws subequal in front; maxillary reaches below first third in eye; teeth simple, slender, conic, uniform, numerous, and uniserial in jaws, those below better developed; interorbital a narrow bony frenum. Gill opening lateral, rather small.

Scales 20 or 21 in lateral axial series to caudal base and 1 or 2 more on latter; 9 transversely between second dorsal and anal origins; 7 predorsal, anterior ones enlarged so that the third is nearly as large as eye. Opercle scaled, though head otherwise appears naked. Prepectoral region, chest, and breast scaly, also caudal base.

D. VI—I, 6, fourth spine 2 in head, first branched ray $1\frac{1}{5}$ to $1\frac{1}{4}$; A. I, 6, third branched ray $1\frac{1}{5}$ to $1\frac{1}{2}$; least depth of caudal peduncle $1\frac{7}{8}$ to 2; caudal $3\frac{1}{8}$ to $3\frac{1}{5}$ in rest of fish, convex behind; pectoral 1 in head, rays 12; ventral rays I, 5, fin 1 to $1\frac{1}{8}$.

Color in alcohol brown and where scales have fallen, each pocket gray-black. An underlaid gray-brown lateral band, with 1 or 2 large and slightly darker ill-defined blotches on trunk, 4 on side of tail with last one at caudal base. Back with 5 indistinct though ill-defined and larger, darker, saddle-like blotches. Along lower edge of body 2 distinctly on trunk, 2 at base of anal fin, and 2 on caudal peduncle, though those on tail all darker below. Dark brown blotch broadly on preorbital, maxillary, and across lower face of mandible. A less distinct dark band down from eye crosses under surface of head. Several dark blotches on postocular part of head. Iris brownish. Fins pale to transparent. First dorsal with large median anterior blackish blotch across first 4 membranes. Each dorsal ray with 4 or 5 brown spots. Caudal with pair of basal blackish brown spots, one above the other, and 5 transverse dark bars. Anal with 2 or 3 slightly darker spots on each ray.

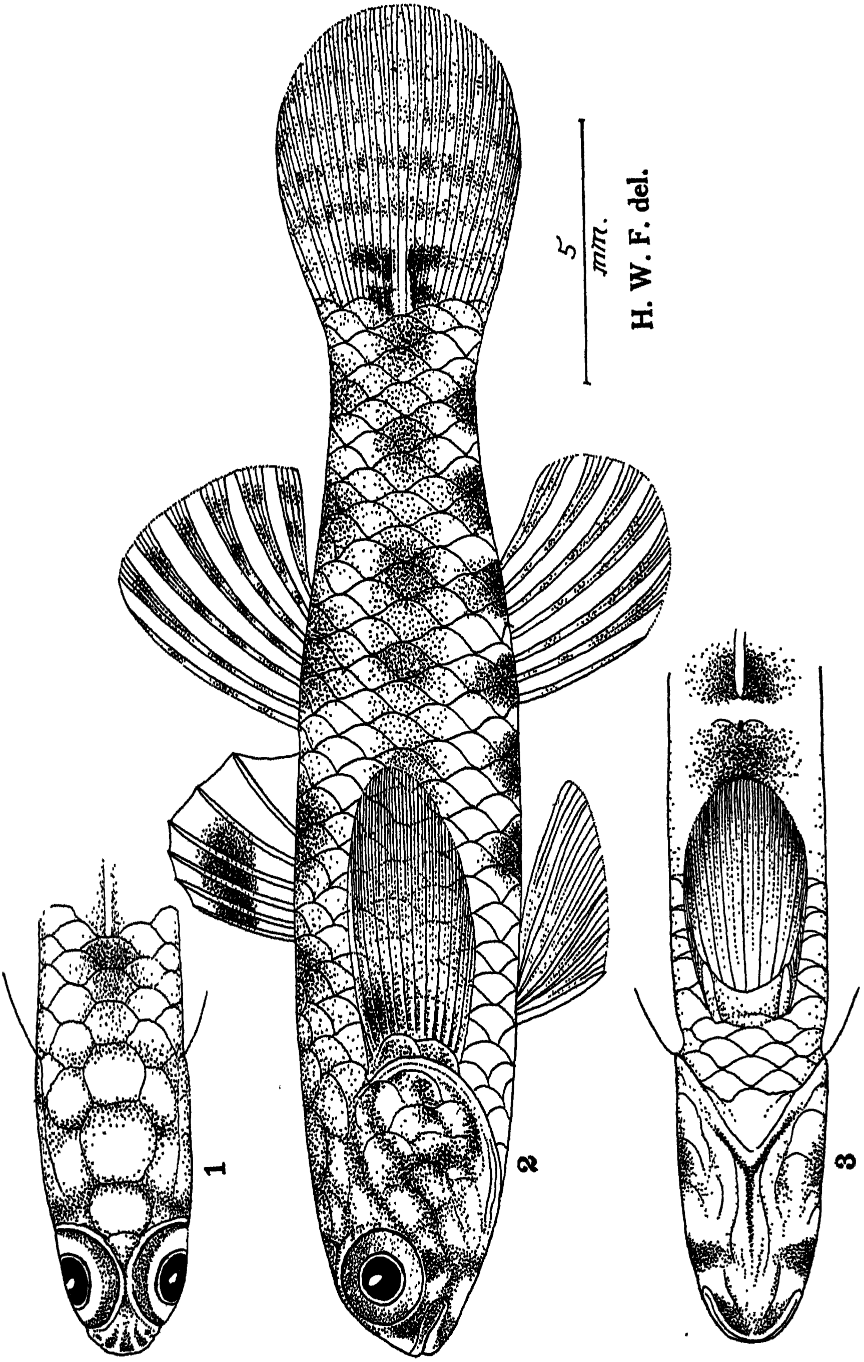
A. N. S. P., no. 70196. Waivivesi, Fiji, on steep rocks near waterfall. March 30, 1941. Mr. R. A. Lever. Length 26 mm. Type. Also no. 70197, same data, paratype, length 24 mm.

Compared with the accounts of *Vaimosa osgoodi* Herre,[1] but without the 2 black basal spots on the pectoral, the presence of several oblique rows of dark spots on the side of the head, and the 7 predorsal scales with the second to fifth enlarged or the third more enlarged than any.

Mr. Lever also sent several other fishes with the above, as follows: 1 male *Stipodon elegans* (Steindachner) from Waivivesi, 3 *Hypseleotris güntheri* (Bleeker) from Nausayi, and from Suva, 1 *Bathygobius fuscus* (Rüppell), 1 *Apogon fasciata* (White), 1 *Salarias fasciatus* (Bloch), and 1 *Tetrodon reticularis* (Schneider).

---

[1] Field Mus. Publ., no. 335, Zool. ser., vol. 18, no. 12, Feb. 15, 1935, p. 420 (type locality, river flowing into Suva Harbor, Viti Levu Island, Fiji Islands; Waigiu Island); no. 353, Zool. ser., vol. 21, April 15, 1936, p. 359, fig. 22 (types).



FIGS. 1-3.—*Vaimosa leveri* new species.

NOTULAE NATURAE

NUMBER 116 OF APRIL 16, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

MAMMAL FOOTPRINTS FROM THE WHITE RIVER OLIGOCENE

BY ROBERT G. CHAFFEE

Assistant Curator of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia

Introduction

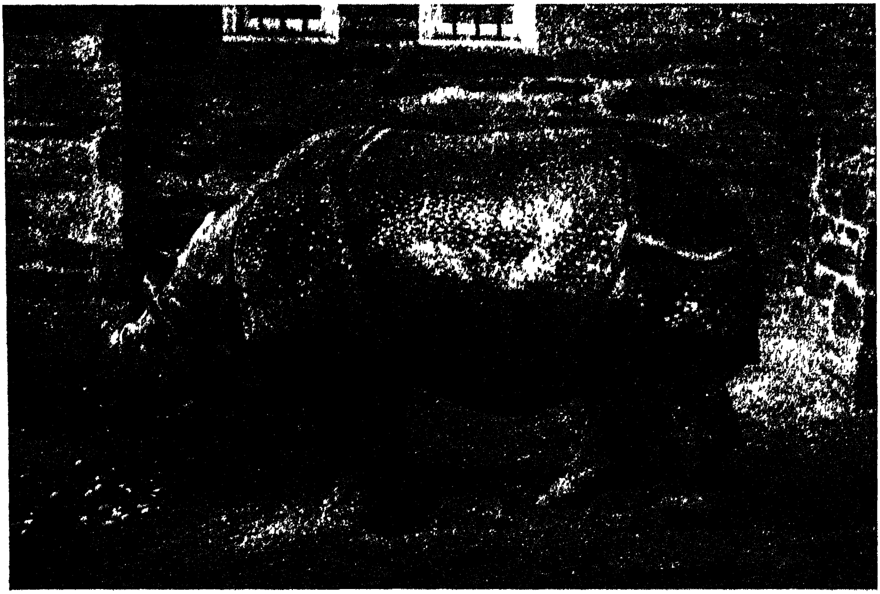
The occurrence of mammal tracks in the White River series is either rare or has received so little consideration from the collectors in the field that few specimens have been recorded. Until the discovery in Wyoming of several prints by the 1941 Paleontological Field Party of the Academy of Natural Sciences of Philadelphia, only two specimens of Oligocene tracks were known and, to the best of the author's knowledge, none recorded in the literature. However, it is the author's belief that even though such foot prints have no taxonomic significance their existence should be recorded in the literature because they may become the source of new knowledge. For instance, the tracks collected in 1941 are of interest not only in illustrating the external characters of the feet but also, as will be shown later, in indicating the possible presence of a large camel hitherto unknown in the Upper Oligocene.

In order to make this paper as complete as possible discussions of the two specimens known previous to 1941 are included here. The author is grateful to the American Museum of Natural History and to the Yale Peabody Museum for permission to include in this paper discussions of the Oligocene track specimens at those institutions.

The author also wishes to express his indebtedness to Mr. Albert Thomson for his identification of the entelodont print, and to Mr. Harold Cook for his aid with the stratigraphy of the Whitman locality.

During the study of the fossil prints it was found necessary to obtain prints of modern mammals for comparison. This was done at the Philadelphia Zoological Garden, where with the excellent help of the staff, prints of the Indian Rhinoceros, the South American Tapir, and the Bactrian Camel were secured. The author is greatly indebted to Mr. Roger Conant and the Staff of the Philadelphia Zoological Garden for their help in obtaining these footprints.

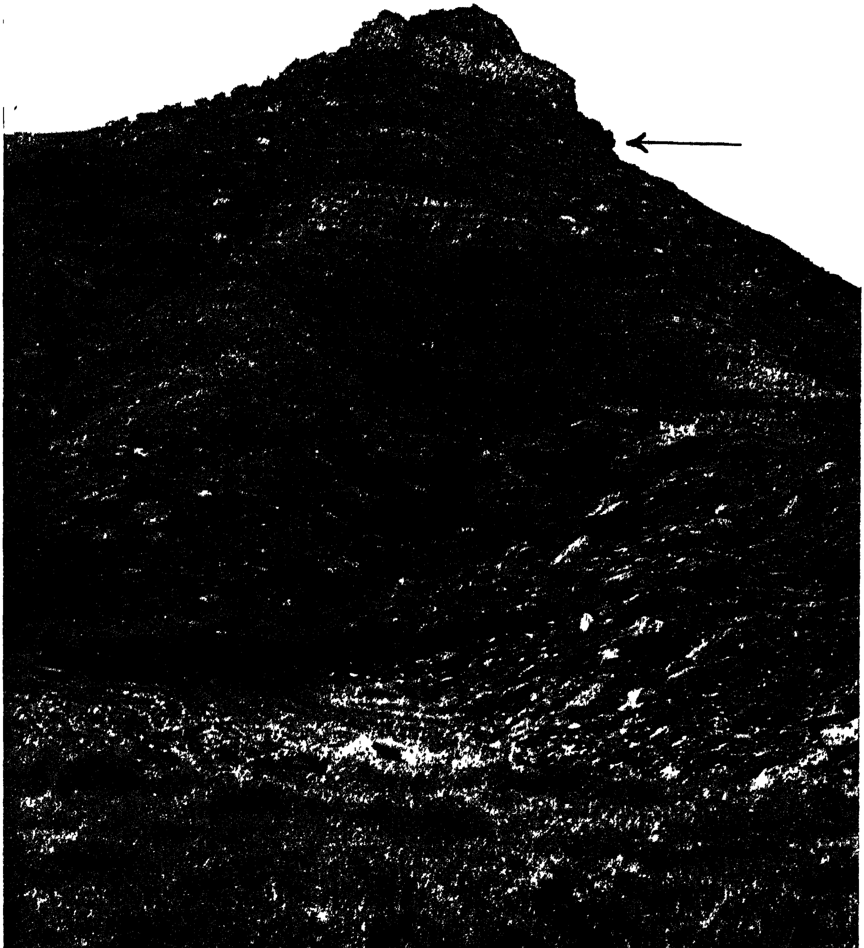
Fortunately the Indian Rhinoceros, " Peggy ", was reasonably tame and did not become excited by the strange people and happenings. A shallow box was sunk in the ground at the end of the ramp leading to her yard. In this a mixture of wet clay and sand was placed and covered by a layer of pure damp sand. Then a bait of apples was placed on the far side and " Peggy " was released. She obliged us by making nice prints of both front feet and the one hind foot. The tracks were then recorded by pouring Plaster of Paris into them.



" Peggy ", the Indian Rhinoceros at the Philadelphia Zoological Garden, making prints for comparison.

The Tapir, being of uncertain temperament, presented a problem. No practical way presented itself of inducing the animal to make prints while walking. However, since an impression of the foot was the next best thing, the keepers solved the situation by pressing the Tapir's feet one at a time into a pan of wet sand. The animal spoiled several attempts by kicking at the wrong moment, but finally plaster molds of the front and hind foot impressions were obtained.

Prints of the Bactrian Camel were made by mixing dirt and water to form a patch of firm mud and then leading the beast on a halter across the



Bald Mountain, near Whitman, Niobrara County, Wyoming. The arrow indicates the position of the Track Sand.

spot. The camel seemed to want to hinder the progress of science since on the majority of her trips across the area she would either straddle the wet patch, or if by chance a foot landed in the mud, she turned it sidewise to spoil the print. However, a mold of the front and hind feet impressions finally were obtained.

All the print molds obtained are figured in this paper.

The Whitman Locality

The tracks at the Whitman locality were discovered on the slopes of a conical-shaped hill and it was subsequently proved that they had come from a channel bed of coarse sand near the top. The prints are preserved as molds of channel sand that filled in the original tracks. Their random occurrence with no trail relation indicates the presence of a water hole previous to the influx of the channel sands.

The conical hill, called locally " Bald Mountain ", is located on Swope's Ranch near Whitman, Niobrara County, Wyoming, and forms the tip of a northwardly extending promontory of Pine Ridge. The drainage of the area flows northward to Indian Creek which in turn flows east to Hat Creek.

SYSTEMATIC DISCUSSION

PERISSODACTYLA

BRONTOTHERIIDAE

BRONTOPS (?)

Brontops (?) Y.P.M. no. VP–13180 Plate 11, fig. 1

Locality.—" Bad Lands, S. D."

Horizon.—" White River Beds ", (Chadron ?).

This specimen is the partial print of the right manus showing only impressions of the third, fourth, and fifth digits. The terminations of the digits are pointed like those of the modern Tapir rather than the modern Rhinoceros.

The generic identification of this track is based on the comparative width of the digits. This is, of course, highly conjectural since the thickness of the hoof is an unknown quantity. However, the comparison shown in the table below seems to point to the identification of this track as *Brontops*.

All measurements in millimeters

From track	Width digit III	Width digit IV	Width digit V
Y.P.M. no. VP 13180	90.6	70.9	57.2
From skeleton	Width extremity mtc. III	Width extremity mtc. IV	Width extremity mtc. V
Brontops dispar [1]			
Car. Mus. no. 92	72	59	—
Brontops robustus [1]			
Y.P.M. 12048 (type)	88	84	—
Brontotherium gigas [1]			
Y.P.M. (type)	76	—	—

RHINOCEROTIDAE

Genus indet.

Genus indet. A.N.S.P. no. 14996, 14997, 14998 A & B Plate I, figs. 2, 3

Locality.—Whitman, Wyoming.

Horizon.—Upper Brule?

By far the commonest prints at the Whitman locality are three-toed tracks of the graviportal type. The center or third digit is the largest. The four specimens collected by the Field Party show considerable range in size but in general these tracks compare favorably with the Oligocene rhinoceroses, *Subhyracodon* and *Diceratherium.* It was thought that the smallest might be from an Oligocene Tapir but the terminations of the toe prints are rounded in this specimen as they are in the larger ones while they are pointed in the modern Tapir.

A comparison of these tracks with those of the Indian Rhinoceros obtained as described above is interesting in the apparently more divergent toes of the Oligocene forms. However, on closer inspection of the modern tracks it may be seen that the interdigital spaces are filled by the comparatively wider termination of the Third digit while the angle between the wide lines of the digits is approximately equal to the same measurement on the fossil forms.

Three of the specimens (14996, 14997, 14998A) are prints of the manus showing a width equal or nearly equal to the length. The fourth (14998B) is the print of the pes showing the elongation of the heel pad.

---

[1] After Osborn, Titanotheres of Ancient Wyoming, Dakotas, and Nebraska, U S.G.S. Mon. 55, 1, p. 664, table.

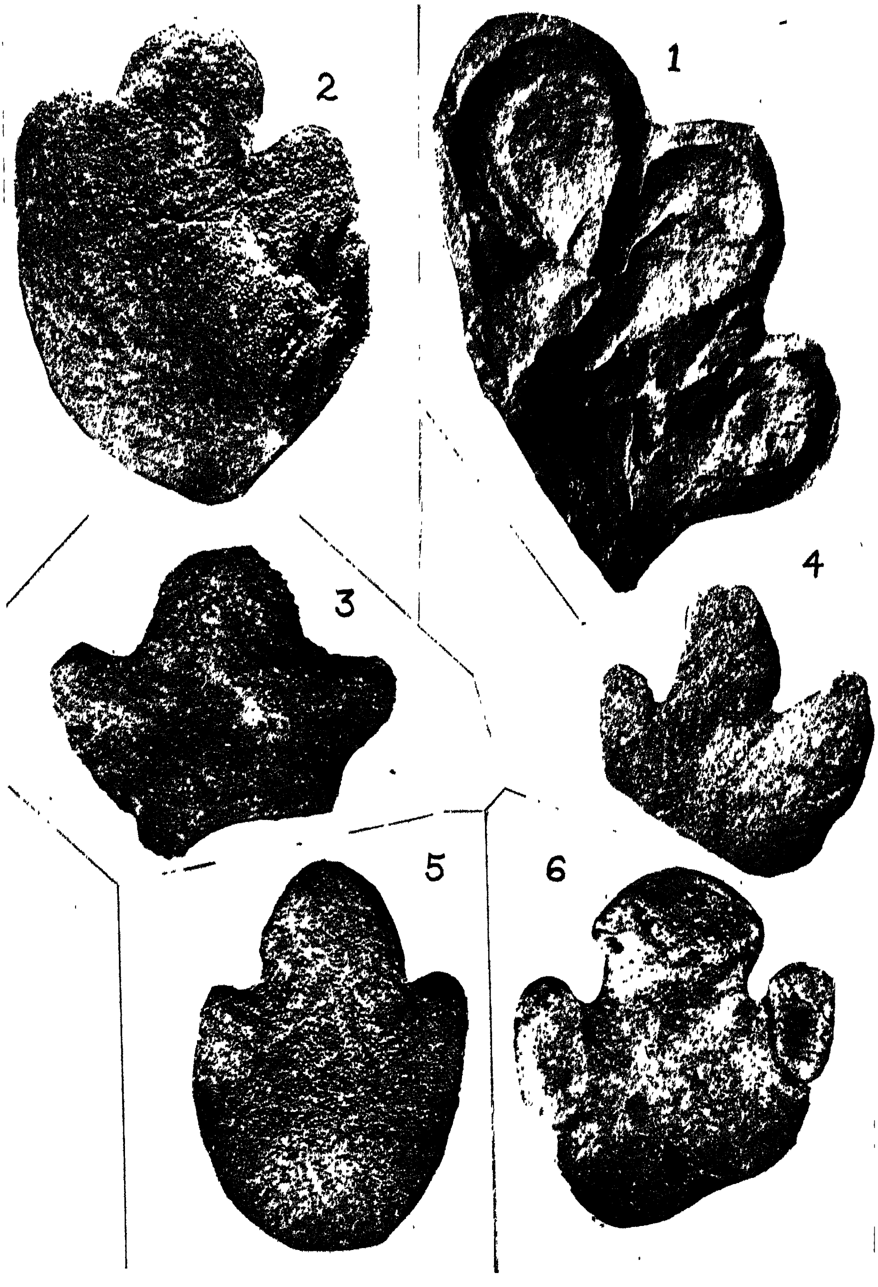


PLATE I. (Explanation at bottom of p. 7.)

All measurements in millimeters

	A.N.S.P. 14996	A.N S.P. 14997	A.N.S P. 14998A	A N S.P. 14998B	*Indian Rhinoceros** Manus	Pes
Total width	117	179	168	181	253	229
Total length	117	180†	168	251	255	370
Width digit III	49	66	76	76	127	111

* Specimen at Phila Zoo Garden. † Estimated.

ARTIODACTYLA

ENTELODONTIDAE

DINOHYUS ?

Dinohyus ? A.N.S.P. no. 14995 Plate II, fig. 1

Locality.—Whitman, Wyoming.

Horizon.—Upper Brule?

Only one specimen of the typically " cloven hooved " type was found at the Whitman locality. It was determined to be an Entelodont by Mr. Albert Thompson. Whether the specimen is manus or pes, right or left is impossible to determine. The generic determination is based on the assumption that the proximal end of the second phalanx in the skeleton of the Entelodonts would approximate the width of the hoof print. If this assumption be true, the print from Whitman is too large for any type of Entelodont other than *Dinohyus*.

All measurements in millimeters

	Total width	Total length	Width of hooves	
A.N.S.P. 14995	98	86	43	45

	Width Proximal End Phalanx 2 Manus	Pes
A. scotti*	31	30
A. mortoni*	18	17
D. hollandi†	41	36

* After Scott and Jepson, The Mammalian Fauna of the White River Oligocene, Part IV, Artiodactyla, Tran. Am Phil. Soc., 28, 1940, pp 421-422.

† After Peterson, A Revision of the Entelodontidae, Mem. Car. Mus., 4, 1909, pp. 126 and 142.

Fig. 1. *Brontops* (?), partial print of right manus. Y.P.M. no. VP—13180. × $\frac{1}{4}$. Fig. 2. *Rhinocerotidae*, Genus indet. Pes. Natural mold. A.N.S.P. no. 14998A. × $\frac{1}{4}$. Fig. 3. *Rhinocerotidae*, Genus indet Manus. Natural mold. A.N.S P. no. 14997. × $\frac{1}{4}$. Fig. 4. Pes mold of modern Central American Tapir. × $\frac{1}{4}$. Figs. 5, 6. Pes and Manus molds of Indian Rhinoceros. × $\frac{1}{6}$.

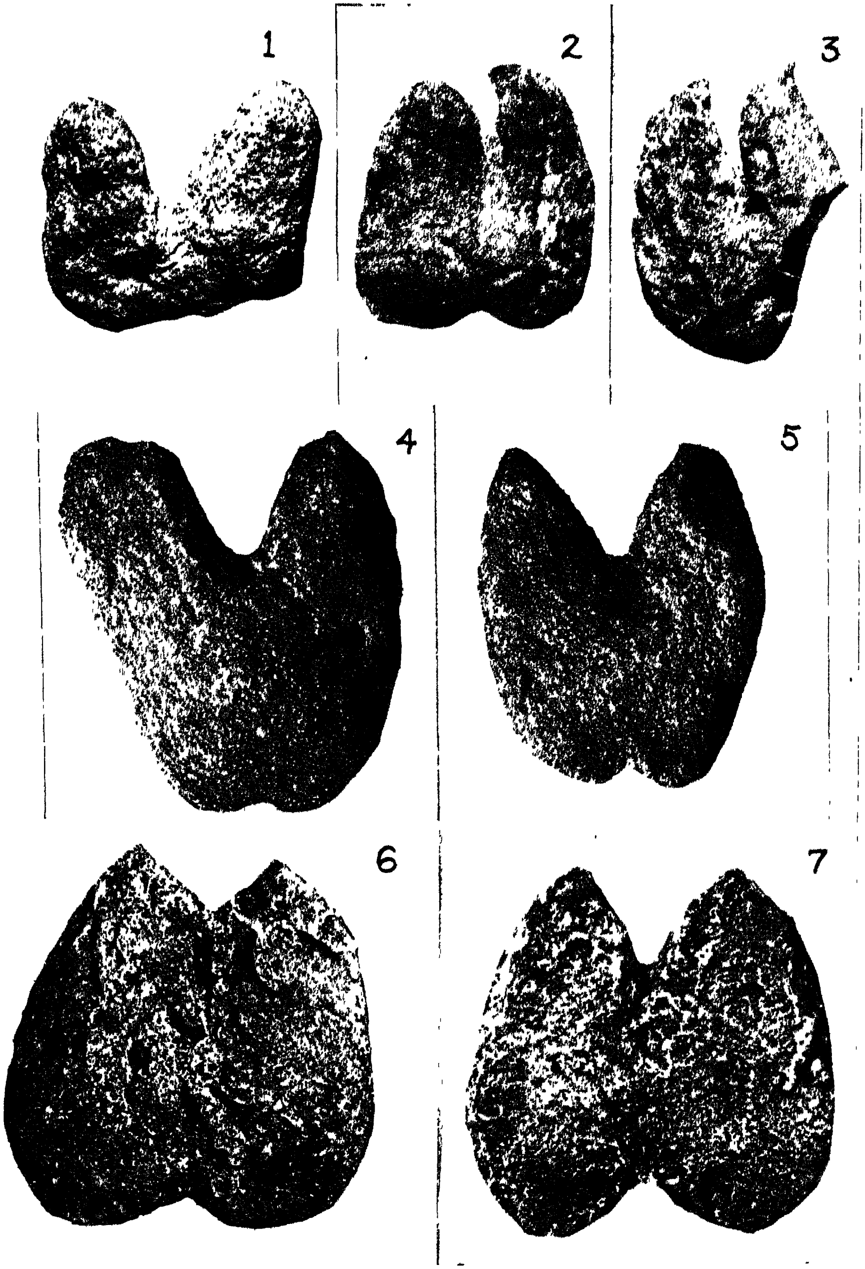


Plate II. (Explanation at bottom of p. 9.)

CAMELIDAE

POEBROTHERIUM ?

Poebrotherium (?) A.M.N.H. nos. 32622, 32623 Plate II, figs. 2, 3

Locality.—Slim Buttes, S. D.

Horizon.—Upper Brule.

The American Museum specimens collected by H. E. Lee in 1937 show three fairly complete print molds. They were made by some camel-like beast since the tracks show heel and toe characteristics similar to the tracks of the modern camel. The terminations of the phalanges are small and pointed, the pads are well defined, and there are indentations between the pads in the heel region. One interesting feature of these tracks is that in the two larger specimens the nail impressions curve away from the longitudinal axis of the print. The older individuals of the modern Llamas show this same tendency.

An attempted identification of these tracks was made by comparing them to the pad and bone measurements of the Dromedary given by Elijah Walton.[2] The ratio of the length of the pad to the length of the phalanges and the ratio of the width of the distal articulation of the metacarpals to the distance between the tips of the digital terminations were used to approximate the size of the bones of the beast making the fossil tracks.

As may be seen in the table on page 10 even the smallest of these specimens is too large for *Poebrotherium.*

OXYDACTYLUS ?

Oxydactylus (?) A.N S.P. nos. 14993, 14994 Plate II, figs. 4, 5

Locality.—Whitman, Wyoming.

Horizon.—Upper Brule?

These two track molds are again definitely cameloid in character showing the same pointed digital terminations, pads, and indentations in the heel. However, they are nearly as long as the tracks of the modern camel though the pads are not as broad and the toes are more divergent.

By the use of the same ratios outlined above the indication is that the animal that made these tracks was nearly twice as large as *Oxydactylus,*

---

[2] Elijah Walton, The Camel—Its Anatomy, Proportions, and Paces, London, 1865.

Fig. 1. *Dinohyus* (?), natural mold. A.N S P. no. 14995. × ⅓. Figs. 2, 3 *Poebrotherium* (?), natural molds. A.M.N.H nos. 32622-3. × ½. Figs. 4, 5. *Oxydactylus* (?), natural molds. A.N S.P. nos 14993-4. × ¼. Figs. 6, 7. Bactrian Camel. Manus and pes molds. (Reduced.)

the largest mid-Tertiary camel. Even when allowance is made for enlargement of the track by side slippage and mud balling up on the pads (indications of neither can be seen on the specimens) they are too large for a possible *Oxydactylus*.

However, if we assume that the American Museum specimens discussed above are actually tracks of *Poebrotherium* and use the measurements for *P. labiatum* (see table) and the largest American Museum specimen (32622b) in the same ratio then the Whitman tracks might have been made by *Oxydactylus*. This would indicate that the ratio of pad length to combined phalange length had grown smaller as the camels had grown larger. This is substantiated to some degree in the seemingly large feet of the Llamas.

STRATIGRAPHY OF THE WHITMAN LOCALITY

As has been said above, the track sands outcrop near the top of a conical-shaped hill. The bed outcrops all the way around the hill ranging in thickness from three to eight feet. Another channel-bed outcrop occurs on the main bluff (the promontory mentioned above) to the southeast and may be a continuation of the track sands.

All measurements in millimeters

	Dromedary[3]	Oxydactylus[4] longipes	Poebrotherium[5] labiatum	Track A.N.S.P. 14993	Track A.N.S.P 14994	Track A.M.N.H. 32622a	Track A.M.N.H. 32622b	Track A.M.N.H. 32623
Length of Phalanges	211.8	109.5	39.0	194.8* 107.5†	191.8* 107.5†	50.9*	70.7*	61.1*
Width distal articulation metacarpels	90.6	47.7	21.0	119.5*	113.8* 86.2†	23.8*	27.7*	32.9*
Length of foot	213.0	110.1*	39.2*	196.0	196.0	51.2	71.1	61.4
Distance between terminations of digits	73.2	38.5*	17.0	96.5	92.0	18.9	22.4	26.6

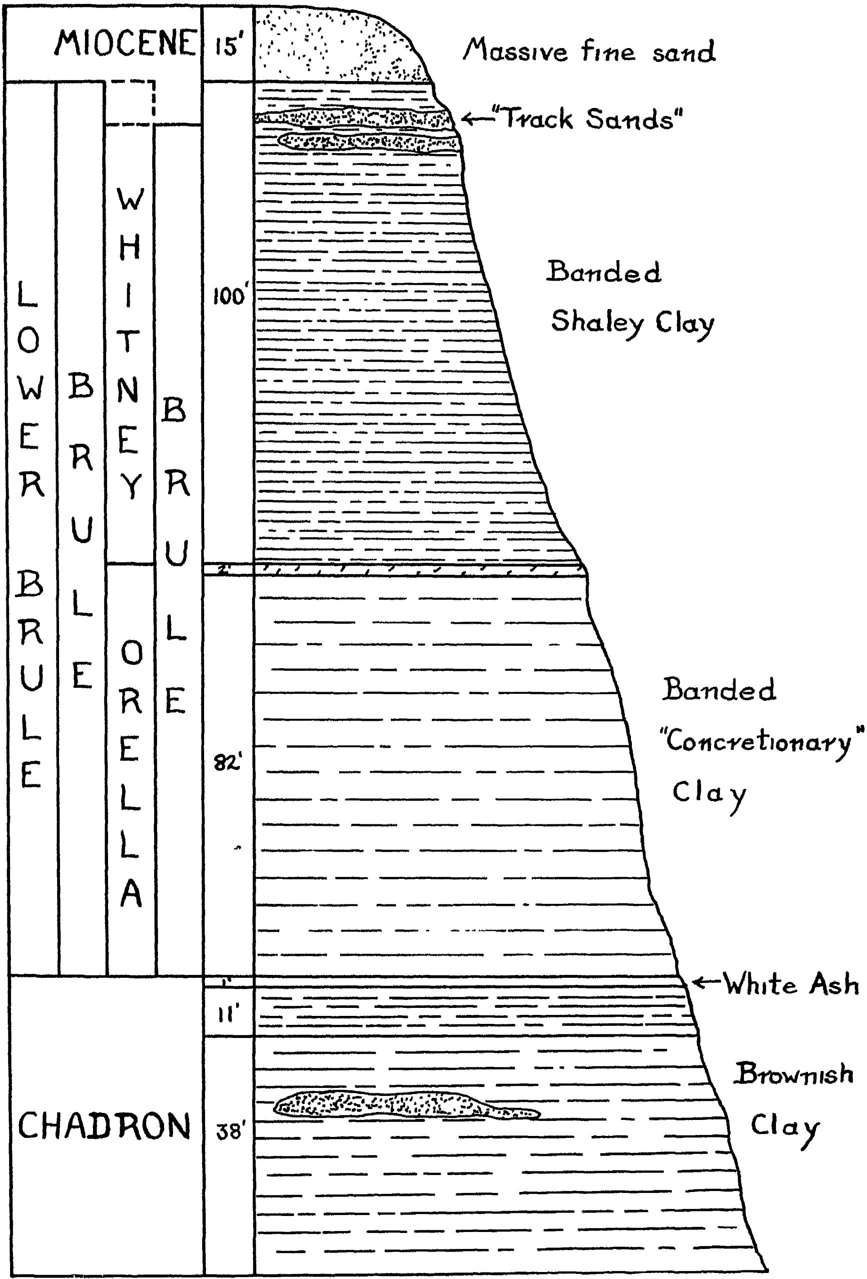
* In ratio to Dromedary. † In ratio to *P. labiatum*—A.M.N.H. 32622b.

---

[3] From Walton, op. cit.

[4] From Peterson, Osteology of *Oxydactylus*, Ann. Car. Mus., 2, 1904, pl. VIII.

[5] From Scott and Jepsen, op. cit., p. 644 and pl. LXV.



Stratigraphic column at "Bald Mountain" near Whitman, Niobrara County, Wyoming, showing several explanations as to the age of the "Track Sand."

The sand is composed mainly of medium coarse, sub-rounded grains of quartz with a calcium cement.

At the base of the hill typical Chadron with Titanothere remains is exposed. The top of the hill is capped by 15 feet of massive fine grained sandstone resembling lithologically the Miocene of Pine Ridge a few miles to the south. Between these two are 184 feet of clay beds. The lower 50 to 75 feet of these beds yielded typical Brule fossils. But diligent search over the remainder of the hill including the massive sandstone at the top yielded no identifiable remains.

As will be seen by the accompanying conventionalized stratigraphic column the track sands outcrop only a few feet below what we may assume on purely lithological grounds to be Miocene. The material between the track sands and the Miocene is lithologically identical with the material below. Therefore, unless we leave only the lower 75 feet of the column in the Brule by placing the Miocene boundary far down the column, the lithologic similarity of the material above and below the track bed would seem to indicate that all the material below the massive capping sands was Brule.

Whether the tracks are in the top of the Oreodon zone (Orella member [6]) or in the *Letauchenia* zone (Whitney member [6]) is conjectural. If it was necessary to pick either one or the other it would seem more likely (from the large size of the Entelodont and Camel tracks) to put the track sands as high in the Brule as possible. However, Schultz and Stout [6] in their type description of the Orella and Whitney members of the Brule (the type locality for these two members is " Toadstool Park ", about 25 miles to the east of Whitman) give the thickness of the Orella as 150 feet and of the Whitney (a " massive Clay ") as 290 feet. They say—" A lithologic break and in places a significant and pronounced disconformity divide the Brule formation into two widespread lithologic units . . . ."

At Whitman there is a slight lithologic break but the top 100 feet is certainly not a " massive clay." It would seem therefore that the whole 184 feet would equal the Oreodon zone.

On the other hand, Mr. Harold Cook has suggested that the track sands are the first regeneration of the Miocene. In a letter to the author from which he kindly gave permission to quote, he says, " It has been my observation that, quite commonly, a new series of deposits, superimposed on older beds, tend to be initiated by beds of coarse materials... It is certain that the bed [track sands] is essentially at the point of contact between the White River and the following Basal Miocene beds. And, as it represents a stage, quite widespread locally...I am inclined to believe it reasonably certain that the beds [track sands] probably represent the first stages of the basal Miocene depositions, rather than the closing stages of the White River Oligocene."

---

[6] Schultz, C. B and T M. Stout, 1941. " Guide for a Field Conference on the Tertiary and Pleistocene of Nebraska ", Special Publ., Univ. Nebr., 1941, p. 37.

Moreover the evidence of the tracks themselves would point to a Miocene fauna The Entelodont and the Camel tracks are both larger than any Oligocene forms. The Rhinoceros tracks might be either Oligocene or Miocene.

It would therefore seem that the tracks were made by Miocene animals on a land surface formed by Oligocene sediments. The channel sands were then deposited during Miocene time before the start of true Miocene deposition in that area. The clays just above the channel bed could be explained by local reworking of the Oligocene, perhaps by the receding waters of the same flood that deposited the channel. In other words Oligocene sediments were deposited in Miocene times. Naturally the discovery of identifiable bone remains in this critical part of the section would clear up the situation tremendously.

NOTULAE NATURAE

NUMBER 117 OF APRIL 1, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW POECILIID FISH FROM HONDURAS

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

Mr. G. A. Bisler Orr sailed the cutter *Virginias* to the Bay Islands off northern Honduras, during January and February 1942, to collect fishes for the Academy of Natural Sciences of Philadelphia. Mr. Orr made an interesting collection of the local shore fishes in a region that has been little-collected. Among them I found 23 specimens representing an hitherto undescribed species belonging to the viviparous Poeciliidae. It appears of special interest as belonging to the genus *Poecilia,* which has so far as known been confined to the Antilles and South America. Its occurence on the off shore islands of Central America is noteworthy. As two males with perfected gonopodia were secured the generic determination is satisfactorily established and diverges in no special way from the other members of its genus.

Poecilia orri new species "Pupsics" Figures 1 (male), 2 (female), and 3 (greatly enlarged gonopodium)

Depth 2½ to 2⅞; head 2⅞ to 3, width 1½ to 1⅗. Snout (in profile), 4⅓ to 4⅘ in head measured from snout tip, broad, as seen from above its front edge truncate; eye 3⅓ to 3⅗, greatly exceeds snout, 1⅕ to 1¾ in interorbital; mouth broad, with short cleft, terminally superior, with closed lower jaw well protruded in front; jaws very protractile, lower jaw weakly formed and pliable; lips somewhat fleshy; teeth minute, close set, simple, numerous, uniserial, rather flexible, and with shorter parallel inner row above; interorbital 1⅘ to 2 in head, low, depressed, flattened. Gill opening extends forward opposite middle of eye. Gill rakers 17?, uniformly short, weak points, about ⅕ length of gill filaments which equal eye.

Scales 23 or 24 in lateral series between suprascapula and caudal base and 4 more on latter; 10 transversely between dorsal and anal origins, 14 or 15 predorsal forward to near snout end. Head well scaled, with 2 rows of scales on cheek.

D. II, 7, first branched ray 1½ to 1⅔ in total head length; A. II, 5, inserted well before dorsal origin; caudal peduncle depth 1 to 1⅕ in its own length or

$1\frac{1}{2}$ to $1\frac{3}{5}$ in total head length; caudal $1\frac{1}{10}$, convex behind; pectoral $1\frac{1}{5}$ to $1\frac{1}{2}$, rays I, 12; ventral rays I, 5, fin $1\frac{3}{5}$ (male) to $2\frac{1}{8}$ (female), and in male first and second rays each with terminal adipose swellings.

Color when fresh in alcohol pale brownish generally. Dark shade on opercle. Iris grayish. On body male with 16 transverse narrow parallel dark bands on side, fewer or about 10 to 12 in young male and female. Dorsal pale gray, with 3 or 4 series of dark gray spots, chiefly on membranes and basal row black, more pronounced or as large black blotch anteriorly on fin. Caudal dull gray, in male with 3 or 4 irregular dark spots on each membrane between rays, absent in female. Other fins uniformly pale gray to whitish.

A. N. S. P. no. 70158. Lagoon and salt water ditch on Bonacca Island, Bay Islands, Honduras. February 16, 1942. Mr. G. A. Bisler Orr. Length 48 mm. Type. Male.

A. N. S. P., nos 70159 and 70160. Same data as type. Male 34 mm. and female 30 mm. Paratypes.

A. N. S. P., no. 70161. Southwest side of Sheen Cays, harbor front and wharves, Honduras. February 2 to 13, 1942. Female 48 mm. Paratype.

A. N. S. P., no. 70162. Blue Rock Bay, northwest side of Bonacca Island, Honduras. February 5, 1942. Female 58 mm. Paratype.

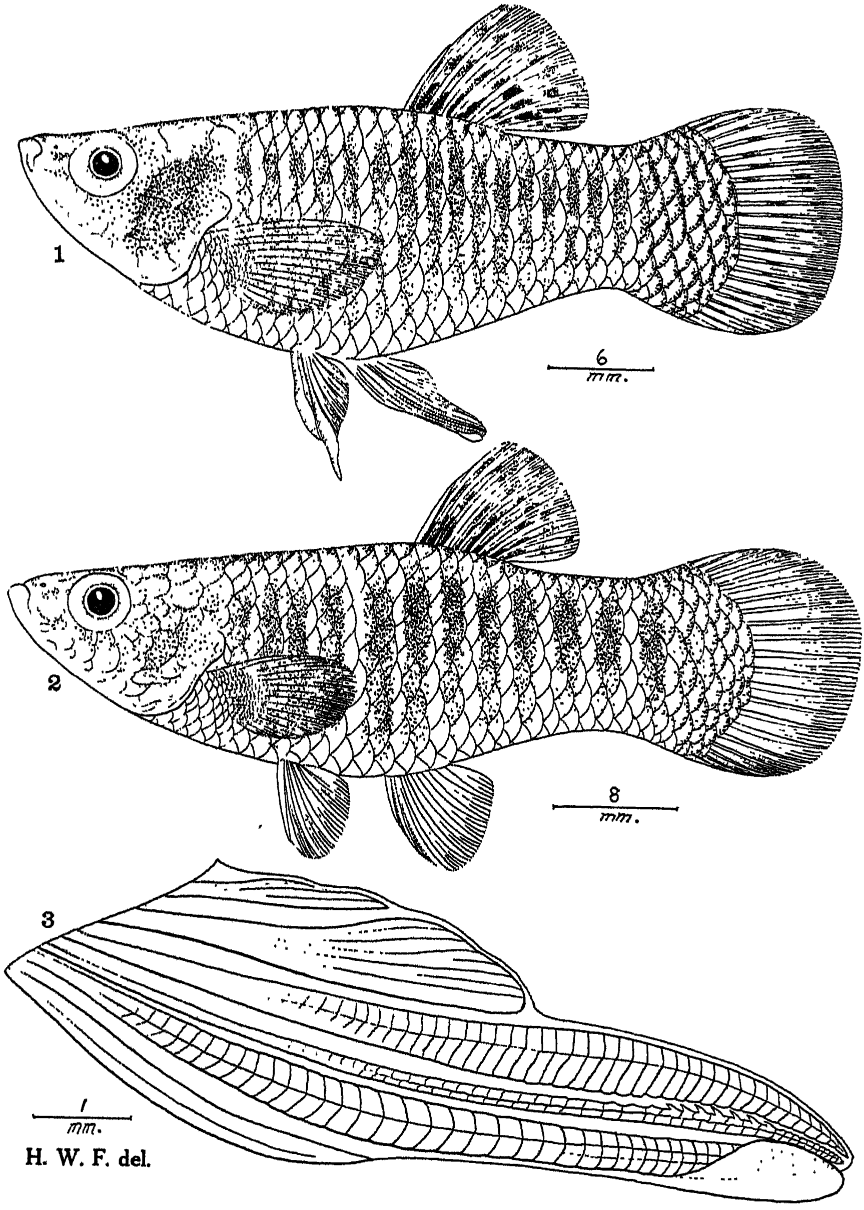
A. N. S. P., nos. 70163 to 70169. Fresh water stream, Bonacca Island, Honduras. February 17, 1942. Seven females 26 to 39 mm. Paratypes.

Compared with some old specimens of *Poecilia vivipara* Schneider, 38 to 65 mm. long from Surinam, though all females and now faded uniformly brownish, they show a relatively smaller dorsal fin, which when depressed reaches $1\frac{7}{8}$ to 2 to the base of the caudal ($1\frac{1}{3}$ to $1\frac{1}{2}$ in *Poecilia orri*), the dark blotch largely posteriorly basal, slightly longer caudal peduncle and the upper and lower edges of the caudal peduncle about the anterior procurrent or rudimentary rays forming a black border both above and below. Their caudal fins are uniformly brown, though after more than a century of preservation in alcohol, for our records show they were received in Philadelphia about 1830 from Dr. Constantine Hering.

Seven males 37 to 45 mm. long represent *Poecilia holacanthus* Hubbs from Hucares, Porto Rico, and show the tail with 3 dark transverse bands, equidistant on fin, besides upper and lower edges of procurrent rays black. Moreover the anterior prepuce-like hood of the gonopodium is subterminal. In *Poecilia orri* it is terminal.

Poecilia orri has also a differently marked dorsal and caudal from either of the two above forms, the gonopodium is also longer extending 2 times in the space to the caudal base ($2\frac{1}{2}$ in *Poecilia holacanthus*).

(Dedicated to Mr. G. A. Bisler Orr, the discoverer of the species.)


1
6 mm.
2
8 mm.
3
1 mm.
H. W. F. del.

FIGS. 1-3.—*Poecilia orri* new species.

NOTULAE NATURAE

NUMBER 118 OF APRIL 9, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

PLIOCENE AND PLEISTOCENE MOLLUSKS FROM THE SANTEE-COOPER AREA, SOUTH CAROLINA

BY HORACE G. RICHARDS

Associate Curator of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia

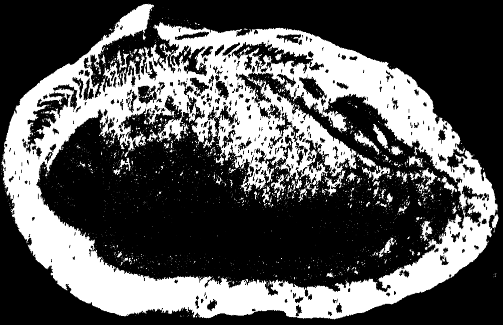
Excavations for the Santee-Cooper Project in Berkeley and Clarendon Counties, South Carolina, have yielded numerous fossils. This paper records material from two localities. One of these localities is definitely of Pleistocene age and is referred to the Pamlico formation; the other is either of late Pliocene or early Pleistocene age, and contains some of the most significant fossils yielded from the excavations.

Flint[1] recently reported some marine diatoms, identified by Dr. Esa Hyyppa as Pleistocene, from a clay sample obtained from a boring made in connection with the Santee-Cooper Project. This sample was given to Flint by Stephen Taber who supplies the following information concerning it. "The boring was made about one-half mile northeast of the bridge over Biggin Creek and in one of the borrow pit areas for the Pinopolis Dam. The locality is about 5 miles north of Moncks Corner. The elevation of the surface is here 75 feet above sea level. From the surface to a depth of 2 feet, fine sand and silt were encountered. Then came 23 feet of sandy clay which contained the diatoms. Below the clay was coarse sand, which rested on Cooper marl (Eocene). Later, when the borrow pit excavations were made, the sand-clay formation was found to be uniform without any evidence of discomformities."

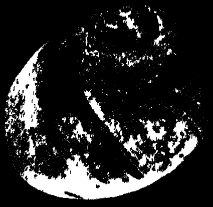
Since this locality is the highest above sea level from which marine Pleistocene fossils have been found along the Atlantic Coastal Plain, it seemed desirable to investigate the matter further. Therefore, in May 1941, a visit was paid to the region. On this visit the writer was guided by Mr. W. Bernard Cormack, geologist with the South Carolina Public Service Authority, to two localities where he had found marine fossils thought to

---

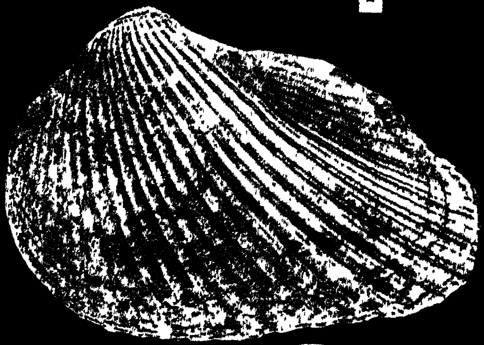
[1] Flint, R. F., Pleistocene Features of the Atlantic Coastal Plain, Amer Jour. Sci., vol. 238, pp 757-787, 1940.



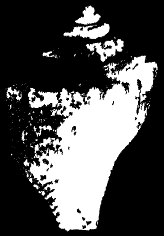
1



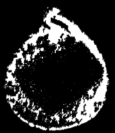
2



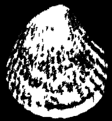
3



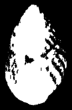
4



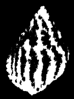
5



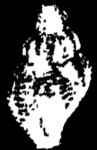
6



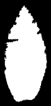
7



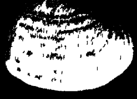
8



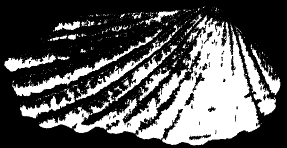
9



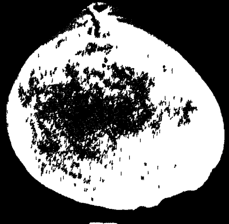
10



11



12



13

Explanation of figures at bottom of p. 3.

be Pleistocene in age. The writer is greatly indebted to Mr. Cormack for assistance in the field and for supplying data on the excavations.

The writer also visited the University of South Carolina at Columbia, South Carolina where, through the kindness of Dr. Stephen Taber, he examined additional material from the Santee-Cooper excavations. He is also indebted to Dr. Taber for information regarding the geology of the Project.

This study is part of a program on Coastal Plain geology aided by a grant from the Johnson Fund of the American Philosophical Society.

A set of fossils, including figured specimens, has been presented to the Academy of Natural Sciences of Philadelphia.

Locality 1.—Tail Canal excavation about 4 miles northeast of Moncks Corner. Elevation of the surface about 10 feet above sea level. The fossils were obtained about one foot above sea level.

Rangia cuneata Gray. *Ostrea virginica* Gmelin.

The fauna is definitely of Pleistocene age and is similar to other estuarine faunas described from the Pamlico formation.[2]

Locality 2.—Diversion Canal, about 17 miles northwest of Moncks Corner. Elevation of the surface about 80 feet above sea level. Elevation of fossiliferous bed about 65 feet. A small pocket in the Santee limestone (Eocene) along the Diversion Canal of the Santee-Cooper Project in Berkeley County, South Carolina.

PELECYPODA

Venus mercenaria Linne

Miocene.—New Jersey to North Carolina.

Pliocene.—North Carolina, Florida.

Pleistocene and Recent.—New England to Florida and Texas.

Venericardia granulata Conrad Figs. 5, 6

Miocene.—New Jersey, Maryland, Virginia, North Carolina, South Carolina, Florida.

Pliocene.—North Carolina (Croatan and Waccamaw), South Carolina, Florida.

---

[2] Richards, H. G., Fauna of the Pleistocene Pamlico Formation of the Southern Atlantic Coastal Plain, Bull Geol. Soc. Amer, vol 47, pp. 1611-1656. 1936

Fig 1. *Arca variabilis* (MacNeil). Fig. 2. *Polinices duplicata* Say Fig. 3 *Arca variabilis* (MacNeil). Fig 4. *Busycon canaliculatum* Say. Fig. 5. *Venericardia granulata* Conrad Fig. 6 *Venericardia granulata* Conrad Fig. 7. *Nassarius obsoleta* (Say). Fig 8. *Nassarius vibex* (Say). Fig. 9 *Urosalpinx cinerea* Say. Fig. 10. *Olivella mutica* Say. Fig. 11 *Mulinia congesta* Conrad. Fig. 12 *Cardita arata* Conrad Fig 13. *Rangia clathrodonta* (Conrad)

Cardita arata (Conrad) Fig. 12

Miocene.—New Jersey, Maryland, Virginia, North Carolina, South Carolina, Florida.

Pliocene.—North Carolina, South Carolina, Florida.

Mulinia congesta (Conrad) Fig. 11

Miocene.—Maryland, Virginia, North Carolina, South Carolina, Florida.

Pliocene.—North Carolina (Waccamaw), South Carolina.

Rangia clathrodonta (Conrad) Fig. 13

Miocene.—Virginia, North Carolina (Late Yorktown).

Pliocene.—North Carolina (Croatan, Waccamaw).

Arca transversa Say

Pliocene.—Florida (Caloosahatchee).

Pleistocene and Recent.—New England to Florida and Texas.

Arca variabilis (MacNeil) Figs. 1, 3

Pliocene.—

Eontia variabilis MacNeil, a close relative of *Arca ponderosa* Say and *A. limula* Conrad, is according to MacNeil, restricted to the Pliocene. Our specimens have been compared with the type by Mr. MacNeil.

Pholas sp.

Fragments resembling *P. costata* Linne of Pleistocene and Recent.

Ostrea virginica Gmelin

Miocene.—New Jersey.

Pliocene.—North Carolina (Croatan).

Pleistocene and Recent.—New England to Florida and Texas.

Glycymeris sp.

Fragments.

GASTROPODA

Nassarius obsoleta (Say) Fig. 7

Pleistocene and Recent.—New England to Florida and Texas.

A closely related form is known from Wilmington, N. C. (Pliocene).

Nassarius vibex (Say) Fig. 8

Pliocene.—North Carolina (Croatan), Florida (Caloosahatchee).

Pleistocene.—Long Island to Florida and Louisiana.

Recent.—New Jersey to Gulf of Mexico.

Eupleura caudata Say
Miocene.—North Carolina (?).
Pliocene.—South Carolina, Florida.
Pleistocene and Recent.—Massachusetts to Florida.

Urosalpinx cinerea Say Fig. 9
Pleistocene and Recent.—New England to Florida.

Olivella mutica Say Fig. 10
Miocene.—North Carolina.
Pliocene.—Florida (Caloosahatchee).
Pleistocene.—Virginia to Texas.
Recent.—North Carolina to Texas.

Busycon canaliculata Say (?) Fig. 4
Fragmentary specimens questionably referred to this species.
Pleistocene and Recent.—New England to Florida.

Polinices duplicata Say Fig. 2
Miocene.—Maryland to Florida.
Pliocene.—North Carolina (Croatan and Waccamaw).
Pleistocene and Recent.—New England to Gulf of Mexico.

Turritella sp.
Young shells resembling the Pliocene *T. subannulata* Heilprin.

As shown from the following tables, the fauna does not fit clearly into either the Pliocene or Pleistocene, although the evidence slightly favors a Pliocene age because of the presence of the index fossil *Arca variabilis* MacNeil. At any rate, the fauna is clearly different from that of any known Pleistocene locality in South Carolina, or for that matter from anywhere along the Atlantic coast. Since all hitherto reported Pleistocene localities have been found below the 25-foot contour (Pamlico terrace and formation) this dissimilarity is not surprising.

The Waccamaw formation of Pliocene age is found at several places in South Carolina but has not been mapped near the present locality. It is best exposed along the Waccamaw River in Horry County, South Carolina and from the banks of the Intra Coastal Canal near Little River and Myrtle Beach in the same county. The absence of characteristic Waccamaw species (such as *Crassatellites gibbessii* T.&H., *Phacoides anodonta* Conrad, *Cardium sublineatum* Conrad, *Pecten eboreus* Conrad, and *Arca limula* Conrad), together with the presence of species not known earlier than the Pleistocene, sheds some doubt on a correlation with the Waccamaw.

Age of Fauna

	Mio.	Plio.	Pleist.	Rec.
Venus mercenaria Linné	×	×	×	×
Venericardia granulata Conrad	×	×		
Cardita arata Conrad	×	×		
Mulinia congesta Conrad	×	×		
Rangia clathrodonta (Conrad)	×	×		
Arca transversa Say		×	×	×
Arca variabilis (MacNeil)		×		
Pholas cf. *costata* Linné			×	×
Ostrea virginica Gmelin	×	×	×	×
Glycymeris sp.				
Nassarius obsoletus (Say)			×	×
Nassarius vibex (Say)		×	×	×
Eupleura caudata Say	?	×	×	×
Urosalpinx cinerea Say			×	×
Olivella mutica Say	×	×	×	×
Busycon canaliculatum Say			×	×
Polinices duplicata Say	×	×	×	×
Turritella cf. *subannulata* Heilprin		×		

Pliocene and Pleistocene	7
Pliocene and not Pleistocene	6
Pleistocene and not Pliocene	4

Several suggestions for the interpretation of this fauna present themselves.

1. The material represents a mixture of Pliocene (Waccamaw?) and Pleistocene faunas. In other words the sea covered the area at least twice since the beginning of the Pliocene. This does not seem likely since the material was mixed indiscriminately throughout the pocket. However, if this theory is accepted, we have the first record of a Pleistocene sea higher than 25 feet above present sea level. This would correspond to one of the higher terraces of Cooke, probably the Penholloway.

2. The fauna represents a phase of the Pliocene later than the Waccamaw. The Croatan formation described from the Neuse River in North Carolina, is sometimes regarded as later than the Waccamaw. Recent collections from the Croatan formation as well as from Neil's Eddy Landing, near Acme, North Carolina (Waccamaw formation) have yielded species not hitherto reported from the Pliocene. It is possible that some of the characteristic Pleistocene species from the Santee-Cooper locality may have existed in Croatan time or at some other time in the late Pliocene.

3. The fauna may represent an invasion of the sea during the early Pleistocene. Several such invasions have been postulated by Cooke, because of the marine appearance of the Coastal terraces; however, prior to this, no paleontological evidence has supported this view. More recently, Flint has postulated only two Pleistocene marine invasions. The Santee-Cooper fauna might belong to the Penholloway terrace-formation of Cooke, or to the earlier marine invasion (Surry Scarp) of Flint.

NOTULAE NATURAE

NUMBER 119 OF MARCH 30, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

TWO NEW CHARACINS FROM EASTERN ECUADOR

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

Mr. W. Judson Coxey obtained three very interesting characins in Ecuador in April of 1931, which he presented to the Academy. Two of them are undescribed, while the third is only known from the types. In appreciation of Mr. Coxey's effort I have dedicated both of the new forms to him. All these specimens are from the basin of the Rio Pastaza, in Tungurahua, where he spent sometime on the river at the Hacienda Las Mascota.[1]

The known form is *Creagrutus mülleri* (Günther), a specimen 112 mm. long. The indifferent photograph of the type, published by Eigenmann in 1927, agrees with my specimen.

Hemibrycon coxeyi new species Figure 1

Depth $3\frac{1}{5}$; head 4, width 2. Snout (in profile) 6 in head as measured from snout tip, which is level with middle of eye; eye 3, greatly exceeds snout, equals interorbital width; maxillary subvertical, reaches below front edge of eye, with 10 teeth along its entire lower edge; mouth broad, with short cleft as seen in profile and closed strong lower jaws protruded; in upper jaw 8 smaller outer teeth and close-set row of as many greatly larger inner ones, all tridentate; lower teeth as 8 large tridentate front ones, with 4 or 5 small posterior ones each side, but no small median symphyseal inner pair; interorbital $3\frac{1}{2}$ in head, convex; below eye broad suborbital bones cover all of cheek down to contact horizontal ridge of preopercle, though posteriorly leaving narrow naked strip before vertical part of ridge; narrow fontanel begins in middle of interorbital width and extends back into short occipital extension. Lower gill rakers 12, lanceolate, $\frac{2}{3}$ length of gill filaments.

Scales (most all fallen and counts according to scale pockets) 39 in course of lateral line to caudal base and 2 more on latter; 7 scales above to dorsal origin, 5 below to anal origin, 17 predorsal. Caudal base scaly, fins otherwise naked.

D. II, 8, first branched ray $1\frac{2}{7}$ in total head length, origin of fin little nearer snout tip than caudal base; A. III, 24, first branched ray $1\frac{3}{4}$ in total head length, fin base little greater than total length of head; adipose fin shorter than eye; caudal peduncle depth 2⅓ in total head length; caudal forked, longer than head; pectoral 1⅕, rays I, 12; ventral rays I, 7, fin 1⅙ in total head length.

---

[1] Annals Entomol. Soc. America, vol. 34, no. 4, Dec. 1941, p. 848.

Color in alcohol drab to gray-brown above, below grayish to bright silvery white. Iris rather dark reddish brown. On lateral line behind gill opening large cluster of dark gray dots, much deeper than eye diameter. On side of tail posteriorly and on caudal peduncle band of similar dark gray dots blending out over median part of caudal fin blackish. Dorsal and anal on outer parts with dark gray dots. Other fins whitish.

A. N. S. P., no. 70155. Hacienda Las Mascota, mouth of the Rio Pastaza, basin of the Rio Marañon, Ecuador. April 1931. Mr. W. Judson Coxey. Length 110 mm. Type.

Most nearly related to *Hemibrycon polyodon* (Günther)[2] from the Pacific slope of Ecuador. I am unable to identify the above described species with *H. polyodon* as the latter is described with 45 scales in the lateral line, depth of body 3½ and length of head 4½. Other differences in Günther's description are the location of the dorsal origin midway between snout tip and caudal base and the absence of a dark humeral blotch or a dark blotch on the side of the caudal peduncle. Eigenmann's assumption " It is more than probable that the types were shipped from Guayaquil but were collected at a considerable elevation in the interior of Ecuador or Peru " appears to be without a shred of evidence and until that evidence is forthcoming had best be forgotten.

Hemibrycon coxeyi resembles *Holobrycon helleri* Eigenmann[3] of the Rio Urubamba region of Peru, especially in the large dark post-scapular blotch. It has, however, quite different structural details, chiefly differing as follows: head 4½; eye 3½ to 3⅗ in head; ventral origin equidistant from snout tip and last fifth or hind end of anal base; occipital extension 7 in space to dorsal origin (5½ in *H. coxeyi*); dorsal origin equidistant from snout and base of midcaudal rays (well nearer snout tip in *H. coxeyi*); caudal lobes very little less than head (longer than head in *H. coxeyi*); pectoral not reaching ventral by 1 to 3 scales (clearly reaches or passes ventral origin in *H. coxeyi*). Eigenmann's account of the scales is not clear, for after describing the scales and " the lateral line nearly straight, a few scales along base of anterior ray " his notes were evidently juggled, as the figure he publishes shows 6 scales overlapping along the base of the anal fin for half its length, these apparently on the body. The margin of the anal fin is also shown dark over ¾ of its posterior extent, a condition not found in *H. coxeyi*. So far as I am able to see, the anal base appears scaleless in *H. coxeyi*.

---

[2] *Tetragonopterus polyodon* Günther, Cat. Fish. Brit. Mus., vol. 5, 1864, p. 330 (type locality, Guayaquil, Ecuador).—Boulenger, Boll. Mus. Zool. Anat. Comp. Univ. Torino, vol. 13, no. 329, 1898, p. 3 (Rio Santiago, western Ecuador).

[3] Mem. Mus. Comp. Zool., vol. 43, pt. 4, May 1927, p. 406, pl. 96, fig. 2 (type locality, Rio Comberciato; Paipay, Rio Crisnejas).

Brycon coxeyi new species Figure 2

Depth 3¾; head 3½, width 2⅛. Snout (in profile) 4⅛ in head, broadly convex as seen from above; eye 4⅛, 1⅓ in interorbital, snout tip level with eye center; maxillary subvertical, extends below first fourth in eye, length from snout tip 2½ in head; mouth cleft short, horizontal, closed jaws even in front; in upper jaw row of 14 closely set tricuspid teeth, followed by an inner series of 12 slightly larger tricuspid teeth and still posterior 4 much larger tricuspid teeth; maxillary with row of 7 or 8 slender tricuspid teeth along lower edge for about ⅓ its length, then short interval followed by 5 or 6 more similar teeth; below, 10 large strong anterior tricuspid teeth, followed closely inside by median pair of small close-set post-symphseal canines, and posteriorly on each dental edge row of 8 to 10 small, short, simple teeth; interorbital 3⅓ in head, broadly convex; broad suborbitals largely cover cheek, leaving only posterior narrow naked strip before vertical preopercle ridge. Gill opening extends forward opposite front of eye. Gill rakers 9+12, lanceolate, equal gill filaments or 1½ in eye.

Scales 40+3 (pockets counted as most of scales have fallen) in lateral line; 8 above to dorsal origin, 4 below to ventral origin, 20 predorsal. Caudal base scaly, fins otherwise appear naked. Scales mostly largest along middle of side.

D. III, 8, first branched ray 1½ in head, origin slightly nearer snout tip than caudal base; adipose fin 1⅓ in eye; A. III, 24, first branched ray $1\frac{9}{10}$ in head, fin base 1¼; least depth of caudal peduncle, 2⅔; lower caudal lobe 1, fin well emarginate; pectoral 1¼, rays I, 12; ventral rays I, 7, fin 1⅘ in total head length.

Color in alcohol drab to gray-brown on back; sides, and below paler to bright silvery white, especially underneath. Diffuse dark blotch on front of opercle below. Iris pale brownish. Obscure dark gray blotch, less than eye on level with eye behind gill opening. Dark gray band on caudal peduncle extends out darker on caudal base and over median caudal rays to their tips. Fins all pale, except some dark brown shades on dorsal and anal terminally. Caudal above dark median band with yellowish to orange shades.

A. N. S. P., no. 70156. Hacienda Las Mascota, mouth of the Rio Pastaza, basin of the Rio Marañon, Ecuador. April 1931. Mr. W. Judson Coxey. Length 168 mm. Type.

An interesting species, apparently not closely related to any of the many known forms distributed in the Atlantic drainage of the eastern Andes.

Both *Brycon brevicauda* Günther and *Brycon pellegrini* Holly, from the Amazon, have smaller scales. Likewise *Brycon capito* Cope. Of the various species Eigenmann listed in 1922, it approaches *Brycon henni* Eigenmann from Colombia, in its comparatively short anal though that species is described with fewer anal rays (21 to 24) and smaller scales (48 to 51). His photographic figure, evidently retouched, shows a differently situated dark opercular blotch, shorter pectoral fin, and more postmedian dorsal. *Brycon stolzmanni* Steindachner from the Pacific slope of the Andes in northern Ecuador, is not noticed by Eigenmann in 1922. It lacks the dark opercular blotch. Konopicky's lithograph as published by Steindachner shows a deeper body (depth 3), shorter pectoral and a dark post-scapular blotch double, or divided with one blotch above the other, the lower on the lateral line. Its dentition is also quite different, the maxillary teeth indicated along the entire lower edge of the bone.[4]

---

[4] *Brycon stolzmanni* Steindachner, Denks. Akad. Wiss. Wien, vol. 41, 1879, p. 170, pl. 2, figs. 6-6a (type locality, Chota, Peru).

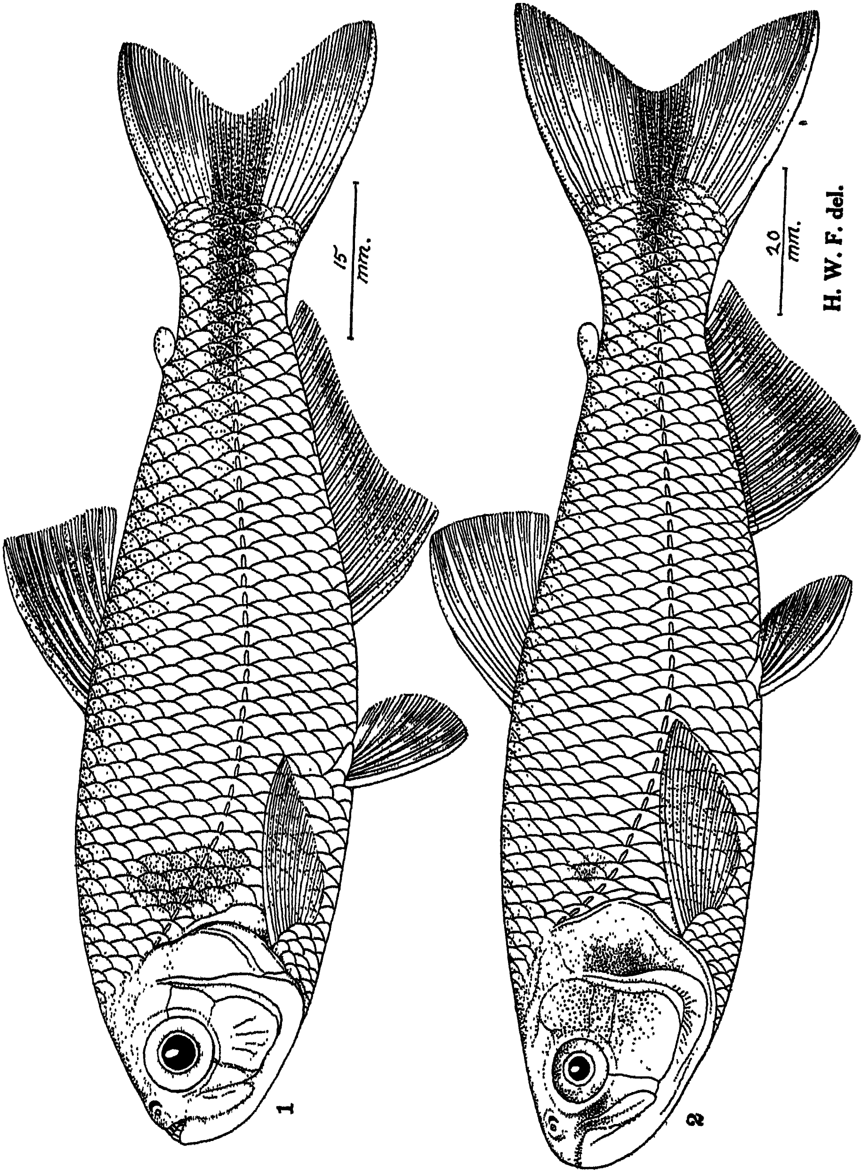


Fig. 1.—*Hemibrycon coxeyi* new species. Fig. 2.—*Brycon coxeyi* new species.

NOTULAE NATURAE

NUMBER 120 OF APRIL 1, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

ZOOLOGICAL RESULTS OF THE SECOND BOLIVIAN EXPEDITION FOR THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA 1936—1937. PART II.—ADDITIONAL NEW FISHES

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

Since my report[1] on the extensive collections made by Mr. M. A. Carriker, the study of another lot of specimens, all from the Mamore-Madeira headwaters, yield 5 additional species, of which 4 are here described as new with 2 new genera or subgenera. These were also secured with the assistance of Mr. Gordon Howes. Altogether the lot includes 330 specimens represented by 17 species.

The Second Bolivian Expedition was supported in part by a grant-in-aid from the Penrose Fund by the American Philosophical Society in 1936; in 1937 it was made possible by the generosity of Mr. Charles M. B. Cadwalader, President of the Academy.

BUNOCEPHALIDAE

BUNOCEPHALUS Kner

PTEROBUNOCEPHALUS new subgenus

TYPE.—*Bunocephalus albifasciatus* new species.

This subgenus is distinguished from the other species included in *Bunocephalus* by the longer and more advanced anal fin, its base greatly exceeding the dorsal base, and its origin premedian in the total length of the fish. The anal fin is thus half again as long as the free part of the caudal peduncle. Ventral origin slightly in advance of the dorsal origin.

The subgenus *Pterobunocephalus* approaches *Dysichthys* Cope,[2] though the latter has been submerged in *Bunocephalus*. However, it may stand as another subgenus, distinguishable chiefly by its lengthened coracoids, which extend back little short of the ends of the depressed pectoral fins.

(πτερὸν fin, with reference to the large anal + *Bunocephalus*.)

---

[1] Proc. Acad. Nat. Sci. Phila., vol. 92, 1940, pp. 43-103, 52 figs.

[2] *Dysichthys coracoideus* Fowler, Bol. Mus. Hist. Nat. Univ. San Marcos, no. 18, ano 5, 1941, p. 368, fig. 12 (outline) (type).

Bunocephalus albifasciatus new species Figure 1

Depth $6\frac{3}{8}$; head 7, width $3\frac{1}{2}$ in length to caudal base. Snout (in profile) 3 in head, 3 in width at front of eyes; eye $5\frac{1}{5}$, impinging on upper profile of head, $1\frac{3}{5}$ in snout, 2 in interorbital; mouth cleft reaches $\frac{2}{3}$ to eye; mouth width $1\frac{1}{2}$ in head, closed lower jaw much shorter; maxillary barbel reaches half way in depressed pectoral spine; 2 short mental barbels each side barely long as eye; short band of minute villiform teeth in each jaw; interorbital width 2 in head, level. Gill opening very small, short slit.

Skin smooth. Only few papillae along cheek and preopercle on side of head, besides row of minute ones forming lateral line, where very close set and of uniform size.

D. V, rather flexible spines, inserted slightly before first third in total length of body; A. 11, origin close behind end of dorsal, highest ray about subequal with base of fin; caudal length 5 in rest of fish; least depth of caudal peduncle 4 in head; pectoral I, 5, broad clavate spine with 9 denticles on outer edge of which the median is largest, anterior and median pointing forward and 2 posterior directed back; 7 on inner edge, all more or less directed forward and last longest, depressed fin reaching dorsal origin; ventral inserted well before dorsal origin, rays I, 5, fin little shorter than pectoral. Humeral extension $\frac{2}{3}$ depressed pectoral; coracoid length $1\frac{4}{7}$.

Color in alcohol dark brown generally. Broad V-shaped whitish band as seen from above, with angle formed in front of dorsal origin. On back behind dorsal 2 pale bars, both above anal, and third at caudal base. Iris dark gray. Maxillary barbels blackish, others dark. Under surface of head and belly pale or livid brownish. Fins all more or less blackish brown. Edges of paired fins pale, with dark spots.

A.N.S.P., no. 69193. Todos Santos, Bolivia. August 8, 1937. Length 40 mm. Type.

Only the type obtained. Known chiefly by its contrasted color markings, the whitish V-mark extended forward from the dorsal, besides the other pale blotches on the back of the tail. The branch of the coracoid each side is quite short. The species approaches *Bunocephalus iheringii* Boulenger[3] in having the ventrals inserted slightly in advance of the dorsal origin. That species has but 9 anal rays, different coloration and proportions.

(*albus* white + *fascia* band, with reference to the V-shaped mark before the dorsal.)

Other species from Todos Santos are 17 *Nannorhamdia stictonotus* Fowler, 29 *Pimelodella howesi* Fowler, 1 *Curimata guntheri* Eigenmann, 50 *Aphyocharax alburnus* (Günther), 15 *Prionobrama filigera* (Cope), 7 *Odontostilbe dierythrura* Fowler, 41 *Astyanax bimaculatus* (Linnaeus), 15 *Gephyrocharax chaparae* Fowler, 7 *Hoplias malabaricus* (Bloch), 11 *Aequidens*

---

[3] Proc. Zool. Soc. London, 1891, p. 235, pl. 26, fig. 2 (type locality, Rio Grande do Sul).

tetramerus (Heckel), 2 *Ctenobrycon hauxwellianus* (Cope), and 18 *Piabina beni* Pearson.

CHARACIDAE

Astyanax chaparae new species Figure 2

Depth $3\frac{3}{5}$; head $3\frac{1}{2}$, width 2. Snout (in profile) $5\frac{1}{3}$ in head as measured from snout tip; eye $2\frac{3}{4}$, greater than snout, subequal with interorbital; maxillary reaches $\frac{2}{3}$ in eye, length $2\frac{1}{4}$ in head measured from snout tip; mouth with short cleft, broad, closed lower jaw well protruded; teeth in jaws strong, tridentate, 2 rows in premaxillary, none on maxillary, and 8 uniserial in mandible with some of larger ones quindentate; interorbital 3, broadly convex; occipital fontanel well developed, begins in front of interorbital space and reaches into short occipital extension; suborbitals broad, entirely cover cheek. Gill opening extends forward nearly opposite front edge of eye. Gill rakers 6 + 12?, finely lanceolate, long as gill filaments, which are $\frac{1}{3}$ of eye.

Scales 34 + 3 in lateral line; 8 above to dorsal origin, 6 below to ventral origin, 6 below to anal origin, 18 predorsal. Basal scaly sheaths on basal front part of anal. Caudal base scaly. Only posterior pseudotympanum distinct before anal fin.

D. II, 5, first branched ray $1\frac{1}{3}$ in total head length; A. III, 23, first branched ray $1\frac{4}{5}$; adipose fin $1\frac{3}{4}$ in eye; least depth of caudal peduncle $2\frac{3}{4}$ in total head length; caudal $3\frac{1}{10}$ in rest of fish, well forked, lobes pointed; pectoral $1\frac{1}{5}$ in total head length, rays I, 14; ventral rays I, 6, fin $1\frac{2}{3}$.

Color in alcohol with back very pale fawn color, lighter below. An undefined silvery lateral band not as wide as eye. Side of head and iris bright silvery white. An undefined cluster of dark humeral dots, forming behind into narrow streak along upper border of silvery lateral band and finally merging with dark dots on median caudal base to extend out over fin to hind ends of rays. An inconspicuous dark gray axial line traverses broad silvery lateral band. Fins all pale or transparent. Dorsal with some brown dots on outer portions.

A. N. S. P., no. 69194. Todos Santos, Bolivia. August 8, 1937. Length 34 mm. Type.

Only the type secured. Approaches *Astyanax multidens* Eigenmann[4] in structural characters, as the body depth, large scales and eye, and the large suborbitals covering the cheek. *A. chaparae* differs in the absence of a dark humeral spot and the dentition, as no maxillary teeth are present.

(Named for the Rio Chapare.)

---

[4] Bull. Mus. Comp. Zool., vol. 52, Dec. 1908, p. 98 (type locality, Obidos; Silva, Lago Sareca); Mem. Mus. Comp. Zool., vol. 43, pt. 3, July 1921, pl. 50, fig. 4 (type); pt. 4, May 1927, p. 323 (types).

Astyanax mizquae new species

Figure 3

Depth $3\frac{1}{5}$ to $3\frac{2}{3}$; head $3\frac{2}{5}$ to $3\frac{1}{2}$, width $1\frac{3}{5}$ to 2. Snout (in profile) $4\frac{1}{3}$ to 6 in head measured from snout tip; eye 3 to $3\frac{1}{2}$, greater than snout, interorbital 1 to $1\frac{1}{8}$; maxillary reaches $\frac{1}{3}$ to $\frac{2}{5}$ in eye, length $2\frac{1}{7}$ to 3 in head measured from snout tip; 3 rows of premaxillary teeth, 1 row in mandible of 10, tridentate, and 3 very small teeth on each maxillary; hind nostril greatly larger than front one; interorbital $2\frac{4}{7}$ to $2\frac{3}{8}$ in head; occipital fontanel begins in front part of interorbital space and extends into short occipital extension; suborbitals entirely cover cheek. Gill opening extends forward opposite front edge of eye. Gill rakers 6 + 10, short low tubercles, $\frac{1}{4}$ of gill filaments which are $\frac{2}{5}$ of eye.

Scales 33 + 3 in lateral line; 6 above to dorsal origin, 4 below to anal origin, 4 below to ventral origin, 15 or 16 predorsal. Caudal and anal bases well scaled. Pseudotympanum not defined or distinct.

D. III, 7, first branched ray $1\frac{1}{4}$? in total head length (as rays of dorsal, anal, and caudal mostly all broken); A. III, 17, I, first branched ray $1\frac{3}{8}$?; adipose fin $1\frac{4}{5}$ in eye; caudal about subequal with head, forked?; least depth of caudal peduncle $2\frac{1}{8}$ to $2\frac{2}{3}$ in total head length; pectoral rays I, 10, fin $1\frac{1}{4}$?; ventral $1\frac{1}{2}$ to $1\frac{4}{7}$, rays I, 5.

Color in alcohol with body largely brown, little paler below. Side of head with many dark brown spots. Back and whole upper side of body with scales broadly edged with very numerous dark brown dots. An underlaid silvery or metallic band, with violet and blue reflections, most brilliant along side of tail and caudal peduncle. At third and fourth scales of lateral line a transverse dark to blackish brown vertical band, extending both above and below level of eye. Iris silvery gray. Fins more or less brownish, lower ones paler.

A. N. S. P., no. 69176. Ele Ele, 5000 feet elevation, Rio Mizque, Department of Cochabamba, Bolivia. October 11, 1937. Length 41 mm. (caudal broken). Type. Also nos. 69177 to 69192, same data, paratypes. Length 25 to 36 mm.

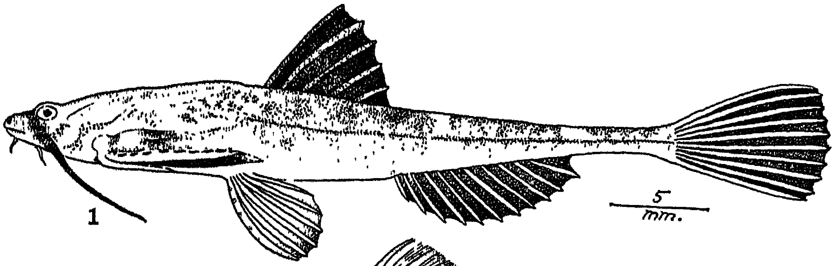
This species is suggestive of *Astyanax scabripinnis* (Jenyns)[5] of eastern Brazil in the vertical blackish shoulder bar, though it crosses the third and fourth scales of the lateral line. There is no dark caudal spot, only a grayish band along side of caudal peduncle, which is reflected out on caudal fin basally. The structural characters are largely in agreement, except for fewer scales between the lateral line and ventral origin. The suborbitals and opercle are with small feeble rugosities.

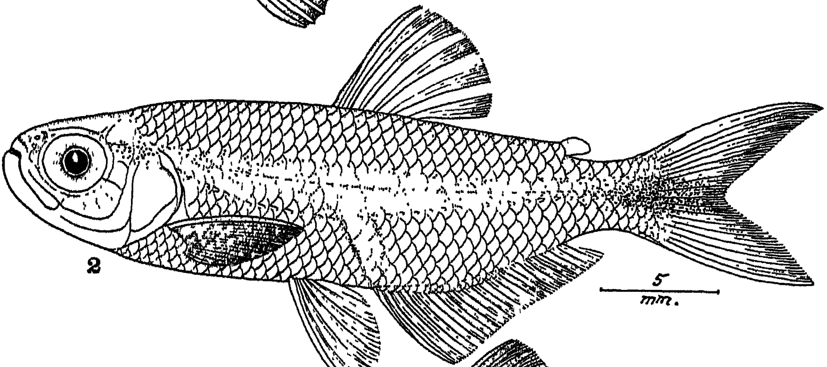
(Named for the Rio Mizque.)

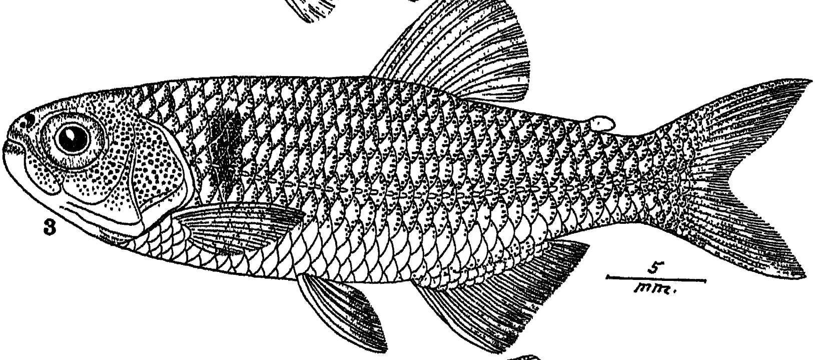
Also 92 specimens of *Acrobrycon ipanquianus* (Cope) with the above.

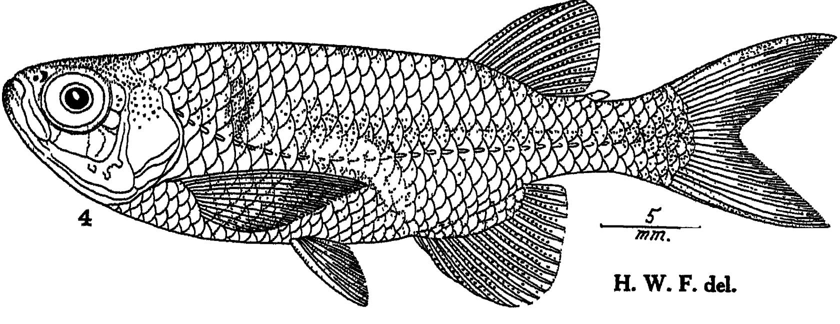
---

[5] Eigenmann, Mem. Mus. Comp. Zool., vol. 43, pt. 3, July 1921, pl. 46, fig. 4 (photograph); pt. 4, May 1927, p. 311 (Eastern Brazil).


1


2


3


4

H. W. F. del.

Fig. 1.—*Bunocephalus albifasciatus* new species. Fig. 2.—*Astyanax chaparae* new species. Fig. 3.—*Astyanax misquae* new species. Fig. 4.—*Corynopomops opisthopterus* new species.

CORYNOPOMOPS new genus

TYPE.—*Corynopomops opisthopterus* new species.

Body well compressed, oblong, deep, with long and nearly horizontal upper profile. Caudal peduncle moderate, compressed. Head moderate, well compressed. Snout short, greatly broader than long and its front end nearly level with upper edge of eye. Eye large, rounded. Mouth superior, terminal, closed lower jaw strongly protruded. Maxillary long, reaches well below eye. Teeth above uniserial, below uniserial and none on maxillary. Interorbital broad. Gill rakers very short weak points. Scales large, rather adherent, smaller below lateral line. Caudal and anal bases scaly. Lateral line well decurved, reaches middle of caudal base. Dorsal inserted well postmedian, midway between middle of eye and tip of caudal, reaches back over small adipose fin. Anal larger, inserted well before dorsal origin, fin base about equals its distance from caudal base. Caudal longer than head. Pectoral long as caudal, reaches well beyond ventral origin, which last is midway between pectoral and anal origins. Preventral area rounded narrowly.

This genus enters the Glandulocaudinae though the genotype shows no special modification of the caudal fin. It approaches *Pseudocorynopoma* Perugia and *Corynopoma* Gill, differing from both in the greatly shorter anal fin. Its general appearance otherwise is much more like the male of *Pseudocorynopoma heterandria* Eigenmann. Its structural details in the different large scales, posterior dorsal, shorter anal and pectoral, and the pigmentation are distinctive.

(*Corynopoma* + ὤψ appearance.)

Corynopomops opisthopterus new species Figure 4

Depth $3\frac{1}{4}$; head $3\frac{1}{2}$, width $2\frac{3}{5}$. Snout (in profile) $5\frac{1}{10}$ in head measured from snout tip; teeth tricuspid, above 10 in outer row and lower row with 8 larger ones; interorbital $2\frac{1}{2}$ in head measured from snout tip, broadly convex; hind nostril greatly larger than front one; occipital fontanel begins over hind part of eye, widens little and reaches into short occipital extension, length of which is $\frac{3}{5}$ of eye diameter; broad suborbitals entirely cover cheek. Gill opening extends forward opposite front edge of eye. Gill rakers 8 + 12, short, slender, feeble, lanceolate points, long as gill filaments or $\frac{2}{5}$ of eye.

Scales 30 + 3 in lateral line; 6 above, 6 below to ventral origin, 6 below to anal origin, 22 predorsal. Pseudotympanum rather large, shorter than eye, followed by still greater or longer translucent area.

D. II, 8, first branched ray $1\frac{2}{5}$ in total head length; A, IV, 12, second branched ray $1\frac{1}{2}$; adipose fin 2 in eye; caudal $3\frac{1}{10}$ in rest of fish, well forked, lobes pointed; pectoral $3\frac{1}{4}$, rays I, 10; least depth of caudal peduncle $2\frac{2}{5}$ in total head length; ventral $1\frac{7}{8}$, rays I, 6.

Color in alcohol light yellowish brown, little paler below. Iris and sides of head bright silvery white. Intersecting first pseudotympanum vertical cluster of dark dots over area 2 scales wide and entirely above lateral line. Dark gray axial line on side of tail and caudal peduncle, surrounded by dark dots, which become blackish at caudal base and expand into an area a little larger than eye. Fins all pale, transparent or whitish, rays of dorsal and anal with brown dots. Some scattered brown dots on top of head and ends of jaws.

A. N. S. P., no. 69195. Todos Santos, Bolivia. August 8, 1937. Length 43 mm. Type.

Only the type obtained. Distinctions largely in the generic account above.

(ὄπισθε behind + πτερόν fin, especially with reference to the dorsal.)

NOTULAE NATURAE

NUMBER 121 OF APRIL 9, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTIONS OF NEW GENERA AND SPECIES OF THE DIPTEROUS FAMILY EPHYDRIDAE. PAPER XIII[1]

BY EZRA T. CRESSON, JR.

Associate Curator, Department of Insects, The Academy of Natural Sciences of Philadelphia

As stated in the previous paper, the following forms were encountered in my studies of this family. Of the five species here described, the types of two and paratypes of two others are in the collection of this Academy. The latter, paratypes, are from the Imperial Institute of Entomology, London.

Atissa africana new species

The cephalad position of the frontals and the absence of any median up-curved facial setae would place this species in the genus *Atissa*. On the other hand, the prominent portion of the face being far above, not at, the epistomal margin, would favor *Atissiella*. It probably represents a distinct genus, but as I have only two, not perfectly preserved, specimens, I hesitate to treat it as such, and prefer to place it in *Atissa*. It is the only African species I have seen of the *Atissa* assemblage.

Pale, yellow to buff: palpi, halteres, tarsi except apices. Antennae darker particularly dorsad. Wings brownish with posterior crossvein more or less clouded.

Opaque with dorsal surfaces brownish, becoming grayish ventrad and on abdomen; face more whitish.

Head scarcely transverse in cephalic aspect; frons slightly transverse; posterior ocelli very close to sharp vertex; posterior ocellars practically absent; ocellars very strong, laterad of or slightly caudad of anterior ocellus line; frontal and frontorbital cephalad of line of ocellars. Face distinctly narrower than frons, longer than broad, slightly carinate; in profile weakly conically convex at mid profile; facial series of two ventromesally, one dorsolaterally inclined bristles near oral margin; no median dorsally inclined pair on the convexity; parafacies well developed to moderately broad cheek, the latter about as broad as antenna III. Postbucca ample. Antennae short; arista thickened on basal two-thirds, with two or three short hairs.

---

[1] Paper XII was printed in these Notulae Naturae, no. 38, 10 pp., 1940.

Mesonotal setulae in six series; prescutellars weak or absent; posterior notopleural far removed dorsad from suture. Abdomen broadly rounded apicad; tergite V of male not much longer than IV; genital segment large. Wings slightly pointed at vein III; costa II not longer than III.

Length, 1.3 mm.

TYPE.—♂; Dohne, Cape of Good Hope, Africa; May 10, 1925; (H. K. Munro); [Transvaal Museum Collection].

Paratype.—1 ♀; East London, Cape of Good Hope, Africa; April 28, 1925; (H. K. Munro); [Transv. Mus.].

Hydrina mackieae new species

In wing maculation, this species is almost identical with *Ilythea spilota*, and in this respect differs from any known species of the present genus. It is apparently most closely related to *H. maculipennis* Robineau-Desvoidy, 1830 (=*Philygria sexmaculata* Becker, 1890) in that the fuscous spots are intervenous rather than venous as is characteristic of *H. punctato-nervosa* (Fallen, 1813), both Palaearctic species.

Pale, yellow to ferruginous: antenna III inferiorly, ground of face somewhat, palpi, fore tibia and all tarsi except apices of latter; mid and hind femora and their tibiae are darker. Halteres paler. Wings hyaline with numerous bar-like fuscous intervenous markings: six to seven in marginal, about four in submarginal, four in first posterior, and others in the more inferior portion of the wing.

Opaque except abdominal tergites IV to V which are polished black. Frons, mesonotum and scutellum, ochraceous except the brown dots at bases of macrochaetae. Face yellow to whitish with dark facialia line and niveous parafacies, cheeks, and postbucca; occiput and pleura more cinereous; tergites I to III subopaque, blackish brown pollinose.

Structurally similar to the Palaearctic *H. sticta* (Meigen, 1830). Vein II very long; costal section III about twice as long as posterior crossvein.

Length, 1.4 mm.

Type.—♂; Uitenhage, Cape Province, South Africa; October 1931; (Miss A. Mackie); [British Museum (Natural History)].

Paratypes.—1 ♀; with same data as for type. 1 ♂; Bloukrans, near Calvinus, Cape Province, Africa; October 1931 (T. D. A. Cockerell). 2 ♂; Stella Bush, Durban, South Africa, October 1931; (Miss A. Mackie); 2 ♀; mountains above Graaff Reinet, South Africa, October 1931. (T. D. A. Cockerell).

Nostima kenyaensis new species

Similar to the European *P. semialata* (Collin, 1913) described from England, in that the scutellum is concolorous with the mesonotum, but the present species has the apical portion of the abdomen polished black.

This is the only species of the genus known from the more Ethiopian influence of Africa, but the fact that it was captured on an aeroplane, may be misleading.

Pale, yellow: antenna III inferiorly, palpi, legs including coxae but not apices of tarsi, and halteres. Wings clear, immaculate with rather dark veins.

Opaque except abdomen basad. Frons almost black, with linear niveous orbits; face cinereous with niveous parafacies; postbucca niveous; occiput dark with a cinereous stripe from each vertical angle to foramen. Mesonotum and scutellum broadly cocoa-brown medianly, broadly niveous laterally, including notopleura and pleura, with lateral angles of scutellum glistening white. Abdomen polished black but tergites I to III more or less pollinose medianly; IV and sometimes III with a niveous spot on ventral lobes.

Head about as high as broad with face and cheeks scarcely broader than antenna III. Wings long with long vein II; costa II at least twice as long as III; ultimate of V four times as long as posterior crossvein.

Length, 1.05 mm.

TYPE.—♂; Kisumu, Kenya Colony, Africa; May 1935; (C. P. Symes; in aeroplane of Imperial Airways); [British Museum (Natural History)].

Paratypes.—4 sex?; topotypical with same data as for type.

Nostima duoseta new species

Because of the presence of but one pair of dorsocentrals (at the sutural region) excluding the prescutellars, the broad scutellum and opaque maculate abdomen, this species belongs in *Nostima* despite its bare arista. In the maculation of the wings it is similar to the Neotropical *N. ilytheoides* Cresson.[2]

Black; antenna III ventrad, face, cheeks, palpi, knees, fore and mid tibiae, bases and apices of hind tibiae and all tarsi except apices, yellow. Halteres white. Wings hyaline with numerous fuscous spots as follows: four broad transverse in marginal, four large round isolated in submarginal, about seven narrow transverse in first posterior, a large one over posterior crossvein, one in discal, about three large round isolated in second posterior, and about five narrow, more or less irregular bars in anal along vein V.

---

[2] Notulae Nat. no. 78, p. 8, 1941.

Opaque, chocolate brown, with shining femora; cinereous areas as follows: spots at vertical angles of frons and above antennae, cheeks, occiput ventrad and two stripes dorsad, pleura, irregular stripes or suggestions of such on the brown mesonotum, apex and roots of scutellum, two large spots on tergites III to V, and a small spot on ventral lobes of same; face yellowish with white orbits.

Frons transverse with converging orbits. Face about .33 times as broad as vertex, three times as long as broad, strongly convex on lower portion, in profile. Cheeks as broad as antenna III, which latter is rounded or with slight superior angle apicad; arista bare or pubescent. Mesonotum with one pair of dorsocentrals at sutural region, strong prescutellars. Scutellum broad trigonal, convex with laterals near base. Wings with long vein II; costal section II nearly twice as long as III; veins III and IV slightly undulating at the spots; ultimate section of V at least twice as long as posterior crossvein.

Length, 1.2 to 1.4 mm.

TYPE.—♀; Mount Victoria, New South Wales, Australia; 1900; (Biro); [A.N.S.P., no. 6659].

Paratype.—1 ♀; Springwood, New South Wales, Australia; 1900; (Biro).

Hydrellia latipalpis new species

A species apparently allied to the European *H. maculiventris* Becker. It is however distinct from all the known Neotropical species by having pale, yellow legs; in which respect it resembles the Formosan *H. luteipes* Cresson, 1932.

Pale, yellow: antennae III except upper margin, palpi, legs including coxae, except apices of tarsi, and halteres. Wings hyaline with pale veins.

Opaque, cinereous (thorax of type badly stained); frontalia black; face sericeous, yellowish white.

Head distinctly broader than high. Eyes round or slightly vertical. Frons broader than long; lunule broadly transverse. Face hardly one-half as broad as vertex, twice as long as broad; orbits distinctly flaring to moderately broad cheeks; in profile distinctly convex below; antennal foveae, carina, and parafacies hardly discernable; the eight facials hair-like. Cheeks hardly as broad as antennae III. Antennae with minute spine on II; arista with nine hairs. Palpi very broad.

Mesonotum with one dorsocentral near suture, none antesuturally; setulae minute. Hind femora with no complete series of lateral setulae. Wings moderately broad; costa II and III subequal in length.

Length, 2 mm.

TYPE.—♀; Colombo, Ceylon; 1902; (Biro); [A.N.S.P., no. 6660].

NOTULAE NATURAE

NUMBER 122 OF MAY 18, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW SPECIES OF DOVE OF THE GENUS LEPTOTILA FROM COLOMBIA

BY JAMES BOND AND RODOLPHE MEYER DE SCHAUENSEE

Department of Birds, The Academy of Natural Sciences of Philadelphia

During the Academy's survey of the birds of Colombia, which has been supported through the generosity of Charles M. B. Cadwalader, its President, Mr. Kjell von Sneidern was fortunate in securing three specimens of a dove hitherto unknown. All were taken at Toché, on the east slope of the Central Andes of Colombia, in the Department of Tolima, at altitudes of 6800 to 7300 feet. One was obtained in forest, the others in second growth. Dr. Chapman describes this locality as " a valley in the Central Andes, but on the Magdalena drainage. The country surrounding the Posada ...... lacks forest growth, but the head of the valley is heavily wooded and would repay more attention than we gave it " (Bull. Amer. Mus. Nat. Hist., vol. 36, 1917, p. 653).

For this fine new species we propose the name:

Leptotila conoveri new species

TYPE.—ad. ♂, A.N.S.P. no. 153361, collected at Toché (6800 ft.), Dept. Tolima, Central Andes of Colombia, April 27, 1942, by Kjell von Sneidern.

Description.—Pileum dark plumbeous gray; hind neck vinaceous brown, slightly glossed with violet; upper mantle vinaceous gray, overlaid with shining violet; lower mantle and wing-coverts purplish brown, with a strong purple sheen in certain lights; tail slate black, the outer pair of rectrices broadly tipped, the penultimate pair narrowly tipped, with white, the white portion of the latter feathers freckled with black; primaries and secondaries slaty black, narrowly edged with light cinnamon distally; chin, throat, and lores white; ear-coverts isabelline, chest vinaceous pink, abruptly terminated at about the middle of the breast; lower breast and abdomen buff, finely vermiculated and freckled with dusky, these markings heaviest on the flanks; center of abdomen white; under tail-coverts white, heavily freckled with dusky on the outer webs; under surface of wings and axillaries cinnamon; iris " white "; bill " black "; feet " light red."

Measurements of type.—Wing 143, tail 96, exposed culmen 17, tarsus 37.5 mm.

Range.—Known only from Subtropical Zone of the Central Andes, in the vicinity of Toché, at elevations of 6800 to 7300 feet.

Remarks.—This very darkly colored dove is not closely related to any other species of the genus. It is perhaps nearest to *ochraceiventris* Chapman from the Tropical and Subtropical Zone of southwestern Ecuador, but differs at a glance by its dark gray, instead of vinaceous pileum, and (in the type, a fully adult male), slaty black instead of brown tail. Although *plumbeiceps* (Sclater and Salvin), of which we have examined specimens in the collection of the American Museum of Natural History from the Western Andes of Colombia, has a dark gray crown, the entire upper surface, including the tail, is brown and the posterior under parts are white.

An additional male resembles the type but evidently is not fully adult, since the tail is not as dark. A female differs from the male in having the tail the same color as the mantle, and the under tail-coverts dusky, edged with buff. The male measures: wing 142, tail 97.5, exposed culmen 17, tarsus 36 mm. The female measures: wing 131, tail 78, bill damaged, tarsus 38 mm.

It gives us great pleasure to name this interesting bird in honor of Boardman Conover of the Field Museum of Natural History whose interest in, and knowledge of, all kinds of game birds is known to everyone.

NOTULAE NATURAE

NUMBER 123 OF JUNE 25, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

ZOOLOGICAL RESULTS OF THE AZUERO PENINSULA PANAMA EXPEDITION OF 1940.[1] PART 1.—A NEW SPECIES OF PERIPATUS

BY EMMETT REID DUNN

Curator of Reptiles, The Academy of Natural Sciences of Philadelphia

The primary object of the Azuero Peninsula Panamá Expedition of 1940 was the investigation of the herpetological fauna of the mountains of that area. These mountains are completely isolated, supporting an equally isolated forest, and no collections of reptiles or amphibians had ever been made in them. Among the specimens taken incidental to the herpetological collection were two specimens of *Peripatus*. These seem to belong to an undescribed species, and one of some general interest, as its characters cast some doubt on the validity of two of the genera (*Oroperipatus* and *Epiperipatus*) which later authors have separated from the original genus *Peripatus*. I have contrasted its characters with those of all Onychophores recorded from the mainland of North America.

The route taken by Mrs. Dunn and myself went from Santiago to Ocú to Las Minas and thence south along the drainage divide down the peninsula (which is the political boundary between the Province of Veragua to the west and the Provinces of Herrera and Los Santos to the east).

The work of the expedition was made possible by the financial support of the Academy of Natural Sciences of Philadelphia and a grant-in-aid from the Johnson Fund of the American Philosophical Society. The cooperation of the Gorgas Memorial Institute of Panamá is also gratefully acknowledged. For advice and assistance in seeing the Onychophore material of the United States National Museum I wish to thank Dr. A. H. Clark, and I name the species for him.

One of the two specimens was taken August 14, under a big slab of bark on the ground, at a place just north of the east-west ridge on top of which are the rocks locally known as Piedra del Tigre. The altitude is 2600 feet, and the locality is close to the eastern border of Veragua, about two days' travel south from Las Minas, and about a half day's travel beyond the last house in the Azuero (that of Ascencion Rodriguez). The other was caught on the night of August 17, as it was walking on a path in the farming community just north of the east-west ridge known as El Jacinto. The altitude is 2300 feet, and the locality is close to the western border of Herrera (about one day south of Las Minas). The specimens were drowned in water and then transferred to 5 percent formalin, a method which avoids shrinkage, so that the dimensions of the preserved specimens are very close to those of the living ones.

---

[1] The few fishes collected by the expedition have recently been reported by Henry W. Fowler, Curator of Fishes of the Academy, in The Fish Culturist, XXII, no. 7, pp. 49-51, figs. 1-3, 1943.

Peripatus clarki new species

TYPE.—In the collection of the Academy of Natural Sciences of Philadelphia. A female taken August 14, 1940.

Type locality.—North base of ridge supporting Piedra del Tigre, Prov. of Veragua, Panamá (in Azuero Peninsula, near western border of Veragua, two days south of Las Minas), altitude 2600 feet.

Range.—Known only from the type locality and from the farm country just north of El Jacinto Ridge in Herrera (one day south of Las Minas).

Diagnosis.—A *Peripatus* with four (two in front and two behind) pedal papillae; four arcs on the sole of the foot; urinary tubercles of the fourth and fifth legs between the third (counting from the tip) and the fourth arc, in half the cases free of the third arc and in half attached to it; 12 dermal plications per segment, complete except for two above each leg which are definitely incomplete (ending on dorsal surface and one on each side of a complete one at the level of leg); papillae on plications with circular base, three small conical ones between each pair of larger cylindrical ones; female with 31 legs; ovary funiculate at level of fifth preanal leg; funicle attached at level of third preanal leg; red above, a light middorsal line, paler below; 100 mm. long; 8 mm. wide.

Remarks and relationships.—Bouvier, who monographed the Onychophora in 1905 (Ann. Sci. Nat., (9), Zool. 2, pp. 1-333) recognized two major groups of the genus *Peripatus*, "les andicoles" and "les caraibes." The former (since elevated to generic rank as *Oroperipatus* by Cockerell) were characterized as follows: "papilles pedieuses" four to seven in number (our specimens have four); "tubercules urinaires" of the fourth and fifth legs included in the third (counting in from the tip) arc of the sole. One species, *intermedius* Bouvier, from Bolivia, has these tubercles not in the third arc but attached to it proximally. Our specimens have them attached proximally on one side and between the third and fourth on the other.

The division "caraibes" have two "papilles pedieuses" in front and one behind. They have the "tubercles urinaires" between the third and the fourth arc, or in the fourth arc.

The present species is even more of an intermediate than *intermedius*. It is not *intermedius* as that form has 32 legs, the ovaries are at the level of the seventh preanal leg, and measures only 37 mm.

Two of the three "andicoles" recorded from North America, *eiseni* Wheeler from Tepic, Mexico (later recorded from Rio Purus, Brazil, by Furhmann) and *corradoi* Camerano from Ecuador (later recorded from Ancon, Panamá Canal Zone, by Clark), are, as Bouvier points out, excessively similar. Bouvier examined topotypical material of both, but it is not apparent that either Fuhrmann or Clark did, and it may be doubted that the ranges overlap so much, or that both occur in North America. They differ from the present form as follows: the legs in females are 27-29; the maximum length is 39 mm.; the excretory pore breaks the third arc of the leg; the "incomplete" plications above the legs are almost complete and irregular in occurrence; the larger papillae are further apart and the smaller are few in number.

A third "andicole", *goudoti* Bouvier, from Vera Cruz, has the third arc broken by the excretory pore; the ovaries are not funiculate; the principal papillae are close together. This "andicole" group occurs in South America in western Brazil, Colombia, Ecuador, and Bolivia.

Bouvier recognized four subgroups in his division "caraibes" of the genus *Peripatus* (all four have been elevated to generic rank by Clark). Three of them occur both in the Antilles and on the mainland of North America. In one of them (*Macroperipatus* Clark, "group of *P. torquatus*", known from Hispaniola, Brazil, the Guianas, Trinidad, Panamá, and Mexico) the dermal papillae have square bases. The present form obviously does not belong here. The North American species are: *geayi* Bouvier from French Guiana (later recorded from La Chorrera, Panamá by Clark) with high conical to cylindrical papillae; *perrieri* Bouvier from Vera Cruz with low pyramidal papillae.

Two of the subgroups are distinguished only by the characters of the circularly based dermal papillae. One, *Epiperipatus* of Clark, has "principal papillae all of same type, passing into each other by all degrees." The species range from Brazil to Guatemala and British Honduras and on the islands of Trinidad, Tobago, and Grenada. The other, *Peripatus* in the strictest sense (group of *P. juliformis* Guilding), has "principal papillae of two types; larger and cylindrical; smaller and conical" (usually three of the latter between each two of the former). The species occur in two distinct areas; Hispaniola to the Lesser Antilles, Venezuela to Costa Rica.

Direct comparison has been made between the two Azuero specimens and a specimen of *P. nicaraguensis isthmicola* Bouvier from La Castilla, Costa Rica. All three were preserved in the same manner, and they resemble each other very closely in the appearance of their papillae. There is no question of the proper identification of the specimen of *nicaraguensis isthmicola*, a form which has a unique structure of the fourth and fifth legs (see below).

I would consider that the two Azuero specimens certainly belong with *nicaraguensis*, i. e., in the group of *P. edwardsi*, *Epiperipatus* of Clark, on this basis of comparison with a form which Bouvier himself put in this group. None the less the dermal papillae in all three specimens are arranged with three small conical ones between two larger cylindrical ones, and thus fit Bouvier's diagnosis of the *P. juliformis* group, *Peripatus* in the strictest sense.

A single species of the *P. juliformis* group has been recorded from the mainland of North America. This is *P. ruber* Fuhrmann from Rancho Redondo, Costa Rica (later recorded from Lino, near Boquete, Chiriquí, Panamá, by Clark). The type was 52 mm. long; had 30 legs (sex not mentioned); the color described is the same as that of the Azuero specimens; the urinary tubules of the fourth and fifth legs are attached proximally to the third arc (as on the right side of the Azuero specimens); the dermal papillae as described and figured are very like those of the Azuero specimens. Nothing is specifically said about the pedal papillae, but as the species was described as belonging to the group of "*P. juliformis*" there were presumably three (two in front and one behind). The Azuero specimens definitely have four (two in front and two behind). I am inclined to think the Azuero form is close to *P. ruber*.

The following species of the *P. edwardsi* (*Epiperipatus* Clark) group have been recorded from mainland North America. None of them seem at all close to the Azuero form:

P. brasiliensis vagans Brues has no regular incomplete dermal plicae above the legs; the urinary tubule is between the third and fourth arc. This common Canal Zone form is known from San Pablo, Barro Colorado Island, Las Cascadas, Rio Chenilla, and Rio Tapia. The other species have two incomplete dermal plicae above each leg.

In *P. edwardsi* Blanchard the urinary tubule is between the third and fourth arc of the foot, the fourth arc is complete. This was described from the Guianas, and was recorded from Darien and from the Canal Zone by Bouvier.

In *P. biolleyi* Bouvier the fourth arc is broken in two by the urinary tubule. This species was described from San José and San Mateo in Costa Rica, and has been recorded by Clark from La Caja and Parismina in the same country. A very similar form from Puerto Barrios, Guatemala, has been called *P. biolleyi betheli* by Cockerell.

P. nicaraguensis Bouvier has the fourth arc much reduced and pushed to one side by the urinary tubule. This was described from Matagalpa, Nicaragua. There was a single accessory tooth on the mandible, and a similar specimen has been recorded from Santa Clara, Costa Rica.

Specimens with two accessory mandibular teeth were considered as *P. nicaraguensis isthmicola* Bouvier, described from San José and Cachi, Costa Rica, and recorded from La Castilla in this paper.

The fourth subgroup of Bouvier's *Peripatus* is represented only by a single species, *P. jamaicensis* Grabham and Cockerell. Clark has called it *Plicatoperipatus*. It has 24 plicae per segment, as against 12 in all the rest. It is known only from Jamaica.

NOTULAE NATURAE

NUMBER 124 OF SEPTEMBER 21, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A LOWER JAW OF CLEPSYSAURUS AND ITS BEARING UPON THE RELATIONSHIPS OF THIS GENUS TO MACHAEROPROSOPUS

BY EDWIN H COLBERT

Associate Curator, Department of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia

Introduction

During the summer of 1942 the two halves of a reptilian mandible and a small portion of a skull were discovered by Mr. George Huber in a quarry on his farm near Blue Bell, Pennsylvania, a few miles north of Philadelphia. The locality, specifically, is 300 yards west of Skippack Pike, two miles north of Blue Bell, Pennsylvania. This quarry is developed in the Lockatong Formation of the Newark series of Triassic age, and has been worked over a period of some forty or fifty years for road metal. The specimen came to light in the course of quarrying operations. It is reported, however, that there were some other portions of this specimen, very probably the remainder of the skull, that unfortunately went into the rock crusher before the significance of the find was appreciated. This is readily understandable, since the jaws as preserved are contained in a block of very hard, dark-gray shale, and unless the side of the block on which the specimen is exposed is in view, the presence of the fossil in the block would hardly be suspected. So it was only by a happy accident that the fossil, incomplete as it is, was saved.

The specimen came to the attention of Dr. Harry B. Steinbach of Blue Bell, Pa. Dr. Steinbach brought it to the attention of Mrs. Charles Willing of Chestnut Hill, who in turn told her brother, Mr. C. Newbold Taylor, about it, and through Mr. Taylor the Academy learned of its existence. Mr. Charles M. B. Cadwalader, President of the Academy, with Professor B. F. Howell and Mr. H. T. Green of the institution's staff, visited the site of the discovery and, through the kindness of the Huber family were given the specimen for the Academy's collections. At a subsequent date the author visited the quarry with Mr. Cadwalader, but in spite of a diligent search no more fossils were to be found.

This specimen is important for several reasons, and therefore merits a careful description and discussion. In the first place, it is the first lower jaw of the genus *Clepsysaurus* to be found in the eastern portion of North America. Hitherto our knowledge of this genus as found in the east has been based upon various teeth, vertebrae, limb-bones, and other skeletal fragments. Secondly, this jaw affords a more adequate comparison between the genera *Clepsysaurus*, *Machaeroprosopus*, and *Rutiodon* than had hitherto been available, and consequently it helps to some extent in clarifying the relationships of these genera. Finally, with a clearer understanding of the interrelationships of the above-mentioned genera it may be possible to clarify our knowledge as to the distribution of the phytosaurs in North America in Triassic times.

The photographic illustrations were made by Mr. A. Delwin Warden, the line drawings by Miss Helen Winchester. Miss Ann Schafer aided the author in the preparation of the typed script.

Description of Specimen

Clepsysaurus pennsylvanicus Lea

Clepsysaurus pennsylvanicus Lea, Isaac, 1851. Remarks on *Clepsysaurus pennsylvanicus*, Proc. Acad. Nat. Sci. Phila, V, p 205

TYPE.—A.N.S.P. 9526, 9555-71, 9595; teeth, vertebrae.

LOCALITY.—Upper Milford, Lehigh Co., Pennsylvania.

HORIZON.—Triassic.

Specimen under consideration.—A.N.S.P 15071. The two dentaries of a mandible, the left one of which contains 23 teeth in a fair state of preservation while the right one contains about 30 teeth, of which the first 18 or 19 are well preserved while the remainder are represented for the most part by alveoli and broken roots. Also a portion of the right temporal region of a skull. This specimen came from a quarry on the farm of Mr. George Huber, the quarry being located about 300 yards west of Skippack Pike, two miles north of Blue Bell, Pennsylvania. The horizon is the Lockatong Formation of the Newark series, of Triassic age.

Diagnosis.—" Dentition heterodont, rostrum shorter [than in *Rutiodon*] Public articular surface of ilium shorter than ischial, fourth femoral trochanter short." [1]

In size the present specimen is somewhat inferior to *Machaeroprosopus adamensis* from Arizona, as described and figured by Camp, the relationship between the two being about as follows:

---

[1] Camp, C L. 1930 Mem. Univ. Calif., X, p. 147.

Length, from tip of symphysis to and including the 25th tooth behind the three enlarged anterior teeth:

Clepsysaurus pennsylvanicus	A N S.P. 15071		315 mm.
Machaeroprosopus adamensis	(Camp, 1930, Pl. IIa)		426
Ratio			
Clepsysaurus pennsylvanicus	3	or	74
Machaeroprosopus adamensis	4		100

However, this new specimen would seem to accord very well in size with the type of *Clepsysaurus pennsylvanicus,* so far as measurements based upon teeth are concerned.

For instance, two of the type teeth of this species may be compared with two teeth from the specimen under consideration as follows:

	Clepsysaurus pennsylvanicus			
	ANSP 9568 type	ANSP 15071 13th dent. tooth	ANSP 9569 type	ANSP 15071 18th dent. tooth
Greatest length	31.0 mm.	34 0 mm	26.0 mm.	26.6 mm
Ant. Post. dia at base...	6.6	7.2	10.0	6 6

Of course, it is not at all likely that absolutely comparable teeth are being used in this series of comparative measurements, but the dentary teeth of *Clepsysaurus* following the three anterior ones are nearly enough of a size so that a comparison such as this is reasonably valid. And from the structure of the type teeth it seems rather evident that they come from the region of the jaw (either upper or lower) behind the enlarged anterior teeth, thus eliminating the factor of heterodonty from the comparison as made. Incidentally it might be pointed out that the type tooth, A.N.S.P 9569, is because of its proportions very likely from the upper jaw, but for the purpose of comparing lengths it serves in the present instance.

Unfortunately many of the teeth of the present specimen have been damaged, but a goodly number are well preserved and show their resemblance to the type teeth of *Clepsysaurus pennsylvanicus,* especially in the development of longitudinal fluting or striations on the outer enamel surface.

What is most characteristic of the new fossil is the marked heterodonty, whereby the three anterior teeth are extraordinarily large as compared with the teeth following them. This is the condition found in the dentary of *Machaeroprosopus,* and heretofore inferred for *Clepsysaurus.* It is to be noted also that the teeth in this present specimen are set closely together, so that it would seem that the jaw was probably relatively short—again a condition that has heretofore been inferred for the genus.

Upon the basis of these characters there seems to be very good reason for identifying this fossil as of the genus *Clepsysaurus* and it is herewith assigned to the species *Clepsysaurus pennsylvanicus.*

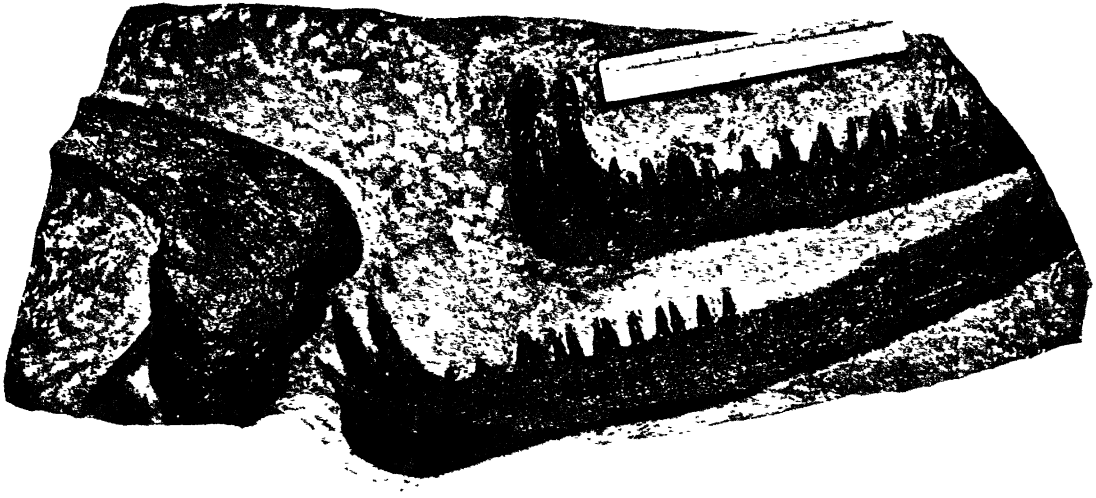


FIG. 1—The two dentaries and portion of a skull of *Clepsysaurus pennsylvanicus* Lea, A.N.S.P. 15071, as exposed in the matrix. Left dentary above, right dentary below, portion of right jugal and quadratojugal on left. Specimen as finally prepared by Mr. Charles J. Lang of the American Museum of Natural History. (One fourth natural size.)

Certainly this present fossil fits the definition given by Camp for both *Clepsysaurus* and *Machaeroprosopus*, as follows:

"Dentition heterodont, rostrum shorter."[2]

And it is strikingly different from the genus *Rutiodon*, which as shown by the material may be defined as follows:

"Dentition homodont, rostrum attenuate."[3]

Consequently the jaw of this new specimen would seem to settle quite definitely the fact that *Clepsysaurus* is a genus separate from *Rutiodon* as has already been suggested by Colbert and Chaffee (1941).[4]

Moreover, upon the basis of this new specimen there should be noted the close resemblance between the lower jaw and the dentition of *Clepsysaurus* and the lower jaw and dentition of *Machaeroprosopus* from western North America, a point that will be discussed below.

The skull fragment, as preserved, comprises but a small portion of the entire skull, and it would seem to consist of a part of the right temporal region. The identification of this fragment is not easy, nor is it certain, for the bones are contained in the heavy block (in which the jaws are encased), so that while on the one side a certain amount of bony surface is preserved, two other sides or edges of the block show only biased sections of bones. An interpretation of the elements present is shown by the accompanying illustration. These are indicated as parts of the jugal, quadratojugal, quadrate, squamosal, and possibly small portions of the opisthotic and ectopterygoid.

Discussion

To return now to the question of the resemblance of the jaw and dentition to the jaw of *Machaeroprosopus*, a point briefly mentioned above, a comparative figure will show very clearly the similarity that exists between the two supposed genera in this respect. In both the dentary is characterized by its expanded termination, bearing the three large anterior teeth on either side, while the horizontal ramus is a fairly heavy element with a somewhat curved lower border, carrying the numerous teeth which are markedly smaller than the anterior terminal teeth. This form of dentary is different from the long, slender structure that characterizes *Rutiodon*. Without going into the difficult and complicated problem as to the validity of various supposed genera of phytosaurs as described from western North

---

[2] Camp, C. L. 1930. Op. cit., p. 147.

[3] Camp, C. L. 1930. Idem, p. 147.

[4] Colbert, Edwin H., and Robert G. Chaffee. 1941. Notulae Naturae, no. 90, pp. 1-19 An extensive bibliography on the subject is to be found on pp. 16-19 of this paper.

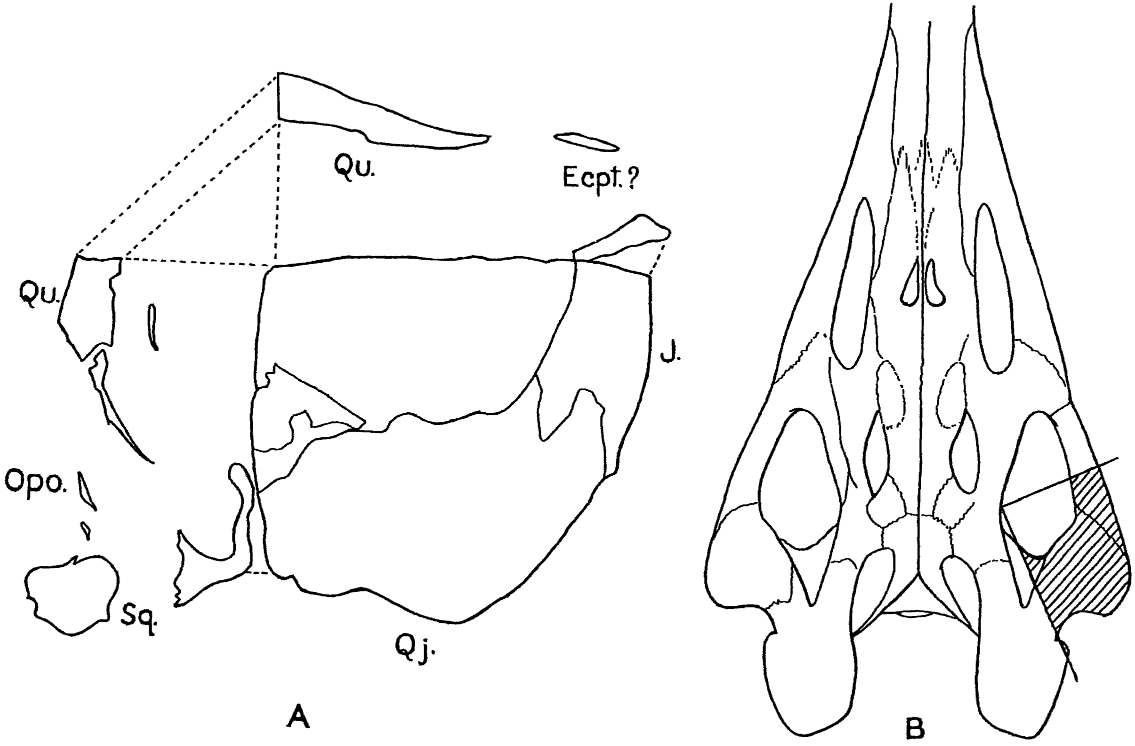


Fig. 2.—A. Interpretation of the skull elements preserved in *Clepsysaurus pennsylvanicus* Lea A.N.S.P 15071. This shows the bones, as seen in Fig 1, and (above and to the left) biased sections. Ecpt.—ectopterygoid, J.—jugal, Opo.—opisthotic, Qj.—quadratojugal, Qu.—quadrate, Sq.—squamosal (One third natural size.)

B. A skull of *Machaeroprosopus*, after Camp, showing the portion of the skull represented in (A) of this figure.

America, it seems probable that except for its smaller size there is not much reason upon the basis of the known evidence of jaws and teeth to separate *Clepsysaurus*, generically, from *Machaeroprosopus*. And size can hardly be regarded as a good criterion for a generic distinction in this case.

Since there is in the present stage of our knowledge no really valid reason for separating *Clepsysaurus* and *Machaeroprosopus* upon the basis of the rostral and mandibular regions, a fact fully recognized by Camp as shown by his remarks and in his key to the phytosaurs, it is necessary to turn to a consideration of other evidence to see if there are valid criteria for the separation of the eastern and western forms.

Camp, in his key to the genera of phytosaurs separated *Clepsysaurus* from *Machaeroprosopus* upon the basis of pelvic and femoral structure, thus:

"Pubic articular surface of ilium shorter than ischial, fourth femoral trochanter short."..*Clepsysaurus*

"Pubic articular surface equal to ischial, fourth femoral trochanter elongate." ....*Machaeroprosopus.*[5]

A close comparison of pelves and femora from the eastern states, almost certainly referable to the genus *Clepsysaurus*, with similar elements as they are developed in *Machaeroprosopus* as found in western North America, fails to show the differentiation of the two genera as delineated by Camp For instance, in all of the specimens examined, there would seem to be little if any appreciable difference in the lengths of the pubic and ischial articular surfaces of the ilium, so that all of these specimens so far as this character is concerned accord with Camp's characterization for *Machaeroprosopus*. This may readily be seen by a comparison of the ilia of the phytosaurs referable to the genus *Clepsysaurus* discovered at Fort Lee, New Jersey, and at York, Pennsylvania, described by von Huene[6] and by Sinclair,[7] respectively, with the ilium of *Machaeroprosopus*, as figured by Camp.

Similarly, comparison of the same materials from eastern and western North America fails to show appreciable differences in the length of the fourth femoral trochanter, a character to which diagnostic significance was accorded by Camp.

Therefore, upon the evidence of the pelvis and the femur, as well as upon that of the lower jaw, there would seem to be little reason for the separation of *Clepsysaurus* and *Machaeroprosopus* It must be recognized, then, that a strong possibility exists for the combination of these two supposedly different types in a single wide-ranging genus, the designation of which should be *Clepsysaurus*.

---

[5] Camp, C L. 1930. Op cit., p. 147

[6] von Huene, F. 1913. Amer. Mus. Nat Hist, Bull. XXXII, art XV, pp 275-283.

[7] Sinclair, W. J. 1918. Amer. Jour Sci., XLV, pp. 457-462

Such a unification of the eastern and western genera is suggested, however, only in a most tentative fashion. Although the evidence at hand points to the validity of this procedure, it is realized that the really crucial evidence as based upon skull structures is as yet lacking, owing to the lack of good material from the eastern region of North America. Therefore, for the time being it would seem best to restrict the name *Clepsysaurus*, at least in its strict application, to the heterodont phytosaurs of the east.

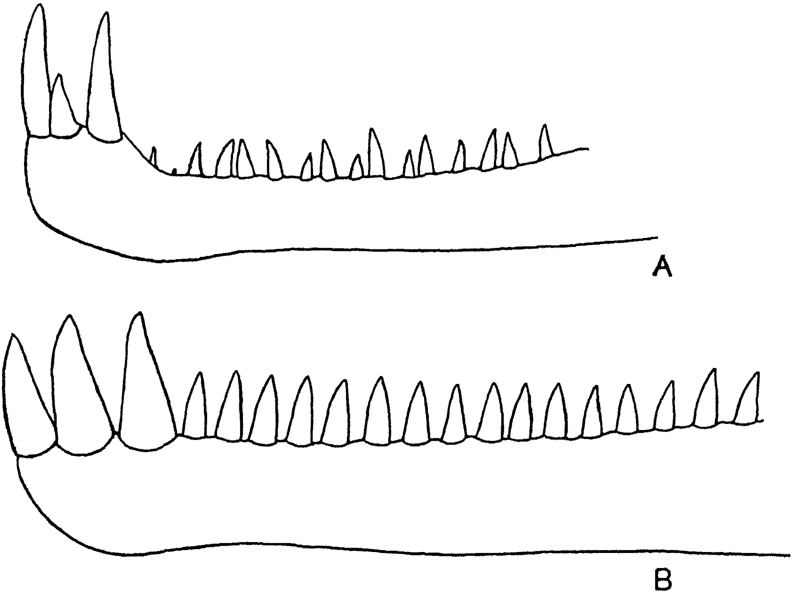


FIG. 3—A. Dentary and teeth of *Clepsysaurus pennsylvanicus* Lea, A.N.S.P. 15071, with the teeth and the alveolar border restored.

B. Dentary and teeth of *Machaeroprosopus adamanensis* Camp, Univ. Calif. Mus. Pal. 26699, after Camp. (Both figures one third natural size.)

NOTULAE NATURAE

NUMBER 125 OF AUGUST 6, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW GENUS AND TWO NEW SPECIES OF HISPANIOLAN PSEUDOPHYLLINAE (ORTHOPTERA; TETTIGONIIDAE)

BY JAMES A. G. REHN

Curator of Insects, The Academy of Natural Sciences of Philadelphia

Included in certain series of Orthoptera taken by Dr. P. J. Darlington, Assistant Curator of Insects at the Museum of Comparative Zoology, in the continuation of his important studies of Antillean insect life, is material of a striking new genus and two new species of pseudophyllid katydids from the Cordillera Central of the Dominican Republic. This flightless genus is more nearly related to the Cuban genus *Polyancistroides* than it is to the related Hispaniolan one *Polyancistrus*, to our knowledge of both of which Dr. Darlington's previous explorations have added very materially

I am indebted to Dr. Darlington and to Dr. Nathan Banks, Curator of Insects at the Museum of Comparative Zoology, for the opportunity to study these most interesting species, paratypic material of both of which will remain in the Academy collection.

SPELAEALA[1] new genus

This striking genus is the third known member of the exclusively West Indian genera group of the subfamily to which Brunner, in his revision of the Pseudophyllinae, applied the term Polyancistri. Of these genera *Polyancistrus* Serville[2] is Hispaniolan and *Polyancistroides* Rehn (=*Pseudancistrus* I. Bolívar, not of Bleeker)[3] is Cuban, while the present one, although nearer to the latter genus, is like the former Hispaniolan.

This new genus agrees with *Polyancistroides*, and differs from *Polyancistrus*, in the lesser development and non-bulbous character of the metazona of the pronotal disk, in the spinoso-scabrose femora, the pronounced development of a median spine on the ventro-cephalic margin of the cephalic (and in one species also median) tibiae, and the biseriate character (in length) of the spines on the same margin. It differs from *Polyancistroides* and agrees with *Polyancistrus* in no important respect, except that the cephalic and median femora do not have markedly biseriate spines on the ventro-cephalic margin. From *Polyancistroides* the present genus can at once be distinguished by the very distinctive structure of the abbreviate male tegmina in the one species of which that sex is known, this consisting of a bulbous, bladder-like structure developed from the area of the humeral trunk, and which like a hood almost completely covers the normal and well-developed stridulating field, the inner edges of the two chamber walls but little separated when the tegmina are in repose. In addition as distinctive features the large spines on the ventro-cephalic margins of the cephalic and median femora are of approximately the same length, and the dorsal surface of all the femora have but a single marked median series of spines, with a short supplementary series distad on the dorso-cephalic margin of the cephalic and median femora.

---

[1] From *spelaeum*, a cave, pit or cavity, and *ala*, wing, in allusion to the remarkable development of the male tegmina, in which the stridulating field is almost completely hidden under a masking cucullate structure springing from the region of the humeral trunk.

[2] For a revision of this genus see Rehn, Trans. Amer. Entom. Soc., LXII, pp. 271-316, pls. XX-XXI, (1936).

[3] For a study of this genus see Rehn, Trans Amer. Entom. Soc., LXIII, pp. 333-345, pls. XXIV-XXV, (1937).

Generic features.—Brachypterous in both sexes, tegmina shorter than pronotal disk. Head subglobose; fastigium short, acute, not surpassing antennal scrobes, dorsad sulcate or subsulcate medio-longitudinally; antennae greatly surpassing body length, proximal article with a single strong spine disto-dorsad. Pronotum short, strongly sulcate, dorsum subdeplanate, surface rugulose to rugose, the two transverse sulci deeply impressed; cephalic margin ascending cephalad, with an erect median spine, which is longer than more lateral series of regularly placed spines on this same margin radiating transversely; caudal margin reflexed subvertically, subtrigonal in outline, with a regular series of spines or spinules, the median one considerably (*bondi*) or but slightly (*scobina*) longer than the more lateral ones, which are directed obliquely dorso-laterad; laterad the pronotal disk is supplied with three pairs of erect, moderately diverging spines, one pair on the prozona and two pairs on the metazona (*bondi*) or with a series of low-strumose nodules in the same relative position on the metazona (*scobina*); lateral lobes subvertical, longitudinal, ventral margin obliquely subascendant caudad. Tegmina very short, not equalling pronotal disk in length; of male (known only of *bondi*) having dorsal surface with an inflated bulbous hood developed from the area of the humeral trunk, and extending dorso-suturad as a hollow chamber almost completely mantling and largely hiding the well-developed stridulating field, and when the tegmina are in repose these hoods have their sutural margins almost in contact; of females of the same general basal outline as in males, but dorsal surface is of more normal character, without a hooded structure yet with the surface between the humeral trunk and a rudimentary stridulating field moderately elevated and bullately domed. Prosternum bispinose, lateral points of mesosternum and metasternum ranging from spinose to subacute angulate. Tenth abdominal tergite of male (known only for *bondi*) deeply U-emarginate mesad, this area filled with membrane which has an apparently glandular median depression. Male cerci (known for *bondi* only) simple, stout, tapering, with brief recurved hook-like apices. Ovipositor of female arcuate, narrowing distad, margins entire, apex acute. Femora robust, particularly in male sex, surface substrumosely scabrose, varying in emphasis with species, dorsal surface with a median series of longitudinally disposed subfalcate spines, an accessory shorter series present distad on the cephalic side on the cephalic and caudal limbs, ventro-cephalic margins of all femora with a varying number of usually obliquely placed strong spines, of approximately the same length except the more proximal ones are smaller, ventro-caudal margins brevispinulose (*bondi*) or appreciably serrulate, at least in part (*scobina*); cephalic tibiae with dorsal margins spined, the cephalic more strongly so than the caudal (*bondi*), or both margins are obscurely multo-serrulate (*scobina*), auditory foramina rimate, covering conchae adpressed; median tibiae with dorsal margins pauci-spinose to definitely spinulose, ventral margins spinose, the cephalic much more strongly so than the caudal; caudal tibiae with all margins spined, the dorso-caudal more strongly so than the others (*bondi*), or the dorso-cephalic margin is hardly, if at all, spined (*scobina*).

Genotype.—*Spelaeala bondi* new species.

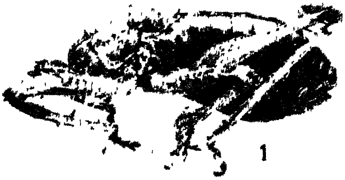
Distribution.—Like the genus *Polyancistrus*, *Spelaeala* is known only from Hispaniola, and specifically the Cordillera Central area of the Dominican Republic. All the localities from which material has been examined are at least five thousand feet elevation, which shows the genus is definitely montane.

Relationship and origin.—In published studies of the genera *Polyancistrus* and *Polyancistroides* I have already discussed their possible history.[4] The discovery of *Spelaeala* makes clearer and more definite at least one angle of the evolution of the group. The fact that *Spelaeala* is very much more closely related to the Cuban *Polyancistroides* than it is to the Hispaniolan *Polyancistrus* would seem to indicate that the center of origin, or at least evolution, of the group was Hispaniola, that *Polyancistroides* probably moved into Cuba from the more eastern island, and that if, as believed by Schubert,[5] the last connection of Hispaniola and Cuba was not more recent than the Lower Oligocene, the evolution of these genera has proceeded very slowly, judging from the relatively close affinity of *Polyancistroides*

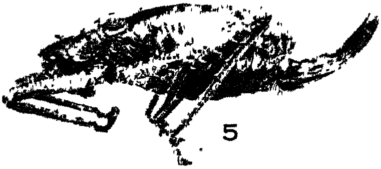
---

[4] See Trans. Amer. Entom Soc., LXII, pp 312-314, (1936); Idem. LXIII, p. 336, (1937).

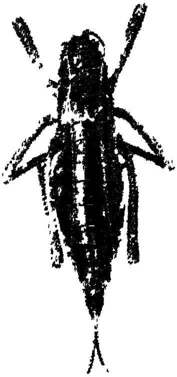
[5] As summarized by Rehn, Trans. Amer. Entom. Soc., LXII, p. 312, (1936).



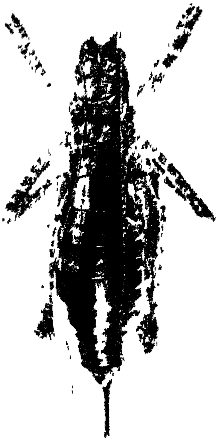
1



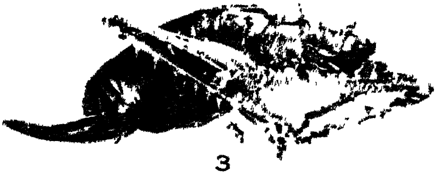
5



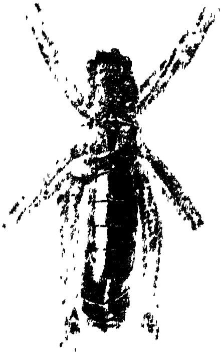
6



4



3



2

Explanation of plate at bottom of p. 5.

and *Spelaeala*. As with other groups of animals Hispaniola has served as a refuge for the Polyancistri, no member of which is known from Jamaica, although pseudophyllids of other genera groups occur on that island.

Key to Species of Spelaeala

Dorsum of pronotum in both sexes with three pairs of erect aciculate spines placed in the usual positions of lateral carinae; median spine of cephalic margin of pronotal disk strongly developed in both sexes, markedly contrasted with the more lateral bordering protuberances. Surface of integument of body and limbs hardly at all shagreenous. Tegmina of female with surface but little impresso-areolate. Cephalic femora with spines of dorsal surface longer and stouter; cephalic tibiae with extensor margins definitely spined. Caudal tibiae with external extensor margin strongly spined. *bondi* new species

Dorsum of pronotum (in ♀ at least) without erect aciculate spines in the usual positions of lateral carinae, median spine of cephalic margin of pronotal disk in female but slightly more evident than the more lateral bordering protuberances Surface of integument of body and limbs quite definitely shagreenous. Tegmina of female with surface strongly impresso-areolate. Cephalic femora with spines of dorsal surface shorter and less pronounced; cephalic tibiae with extensor margins unspined. Caudal tibiae with external extensor margin weakly if at all spined. (Male sex unknown.) *scobina* new species

Spelaeala bondi[6] new species Figs. 1-4, 7-9.

The major features which distinguish this species from *S. scobina* have been given in the preceding key.

Type.—♂; Loma Rucillo[7] and mountains to the north, Dominican Republic, Hispaniola. Elevation, 5000-8000 feet. June, 1938. (P. J. Darlington.) [Museum of Comparative Zoology.]

Size medium; form subcompressed; surface of pronotum rugulose and spinose, of femoral dorsa, particularly of cephalic and median pairs, strumosely scabrose as well as spined, most of body surface glabrous.

---

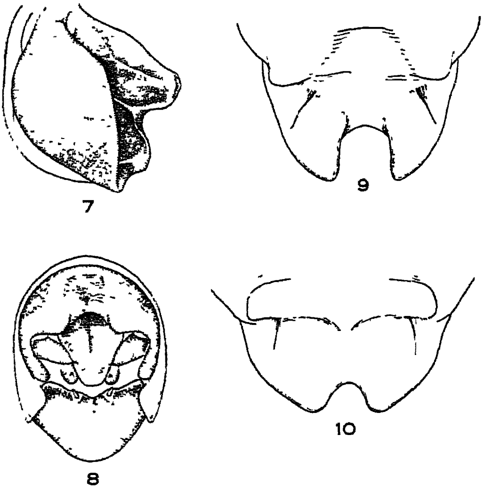
[6] In appreciation of the extensive and discerning studies of Antillean bird life which have been made by my colleague, Mr James Bond, Associate Curator of Birds of the Academy of Natural Sciences of Philadelphia.

[7] Loma Rucillo (or Loma Rucilla, as it appears on certain charts) is situated approximately five miles northwest of the well-known settlement of Constanza, in the main ridge of the Cordillera Central It is one of the highest peaks of Hispaniola, but is surpassed in elevation by Loma Tina. Loma Rucillo is also known as Pico del Yaqui.

Spelaeala bondi new genus and species Male (*type*) Loma Rucillo and mountains to the north, Dominican Republic, Hispaniola. FIG. 1—Lateral view FIG. 2.—Dorsal view Female (*allotype*) Same locality as male. FIG. 3—Lateral view. FIG. 4.—Dorsal view. *Spelaeala scobina* new genus and species Female (*allotype*). Same locality as *S. bondi*. FIG. 5—Lateral view. FIG. 6.—Dorsal view. (All figures natural size.)

Head well seated in pronotum, slightly narrower than latter, greatest width across genae approximately equal to $\frac{2}{3}$ of head depth, face subobsoletely deplanate; eyes relatively small, globose, their vertical depth not surpassing length of proximal antennal article, prominent. Antennae over three times as long as the body, spine on proximal article pronounced, over half as long as the axis of the article, and slightly curved

Pronotum short, as seen from dorsum with median length subequal to greatest width across lateral lobes, very definitely sellate, cephalic margin moderately but rather briefly ascending, the caudal one strongly and lamellately subvertical in its deflection, forming a pronounced and high " cantle " to the saddle; cephalic margin armed with a median strong, erect, slightly recurved spine, laterad of which are three to five smaller yet marked spines on each side, spaced and radiating laterad and of varying length; caudal margin in general triangular as seen in cephalic aspect, the peak of the triangle short spiniform, the more lateral portions of the margin with five (in male paratypes as few as four) spines of varying length obliquely directed laterad; more caudal transverse sulcus more strongly incised than the more cephalic one, metazona as seen from dorsum, and disregarding the foreshortening of its subvertical more caudal section, shorter than the prozona, no median carina present except briefly as a stiffening ridge to the median point of the caudal margin, mesad between the two transverse sulci is placed



Spelaeala bondi new genus and species. Male (*type*). Loma Rucillo and mountains to the north, Dominican Republic, Hispaniola. Fig. 7—Dorsal view of left tegmen. Fig. 8—Caudal aspect of apex of abdomen. Female (*allotype*). Same locality as type Fig. 9.—Outline of subgenital plate.

Spelaeala scobina new genus and species. Female (*type*). Same locality as *S. bondi* Fig. 10.—Outline of subgenital plate. (All figures greatly enlarged) a low but definite and subacute node, laterad in the usual position of lateral carinae are placed on each side three erect spines, one cephalad of the more cephalic transverse sulcus, the other two closely placed caudad of the more caudad one and cephalad of the erect caudal section of the metazonal disk: lateral lobes definitely longer than deep, cephalic margin sinuately vertical, ventral margin nearly straight horizontal, weakly ascending caudad, caudal margin obliquely ascending subarcuate, surface of lobes quite deeply impressed by the continuations of the transverse sulci of the dorsum, with the addition of a less evident arcuate supplementary one on the metazona originating dorsad at the base of the more caudal of the two metazonal spines.

Tegmina very short, not over $\frac{2}{3}$ as long as the pronotum mesad, with their combined width as seen from the dorsum definitely greater than their length; costal margin nearly straight, disto-costal angle well-rounded, distal margin arcuato-truncate, disto-sutural angle sharply rectangulate: marginal field relatively narrow, simple, subdeplanate; from the area of the humeral trunk there is developed a strongly convex, bullate, in fact bladder-like, structure which completely arches over the stridulating field, leaving a considerable chamber between it and the stridulating field,[8] the sutural margin of this extension subarcuate as seen from dorsum, this margin terminating distad at the disto-sutural angle of the tegmen, the extreme disto-lateral portion of the discoidal field relatively deplanate and not involved in the inflation, which in the two tegmina when seen from the dorsum has a general subcordiform outline; stridulating field normally developed, but so completely covered by the dorsal chamber walls that its exact details can be determined only by the removal of these walls, which is inadvisable with any of the present limited series, the stridulating vein, however, is seen to be well developed, the true sutural margin of the tegmen strongly concave distad of that vein, and the speculum is large and covers half the length of the field. Wings not evident.

Prosternum with the usual paired spines straight and subparallel, erect, elongate and aciculately conical; mesosternum with lateral angles erect, sublamellato-spinose, slightly recurved; metasternum with lateral angles similarly developed but shorter, blunter and less erect.

Abdomen with the three proximal tergites slightly dentate produced meso-caudad, in decreasing emphasis distad. Tenth abdominal tergite mesad with a deep reversed U-shaped emargination, which occupies $\frac{5}{6}$ of the median length of the tergite and is filled with soft membrane which reaches to the base of the supra-anal plate, while slightly caudad of the middle in this membranous part is placed a deeply impressed, but relatively small, apparently glandular area, the angles of the distal margin of the tenth tergite laterad of this emargination well rounded: supra-anal plate acute trigonal with the immediate apex rounded, its surface appreciably depressed below the cingulate border rim, in addition with a shallow medio-longitudinal sulcus in proximal $\frac{2}{3}$; cerci short, not quite reaching as far distad as the apex of the supra-anal plate, stout, tapering, the apex rather blunted with a short, mesad recurved mucronate spine; ventrad of the cerci are placed paired appendages of very similar character to the cerci, but slightly shorter and with their apical hook more dentate, less spiniform and facing dorsad;[9] subgenital plate short, subcompressed, distal margin very shallowly obtuse-angulate emarginate, mesad, styles very short, stout, apices subacute.

---

[8] This arrangement quite conceivably may produce greater resonance of the stridulations by acting as an amplifying chamber.

Femora relatively stout, subinflated, more slender proximad, with dorsal surfaces quite definitely substrumose-scabrose apart from the spination of the same: cephalic femora with the medio-dorsal spine series numbering 6-7, the distal accessory series toward the cephalic face 2-3, ventro-cephalic margin with 3 spaced spines,[10] the proximal, which is premedian, and the distal, which is situated near the base of the genicular lobe, are placed in the same relative position on the femur, while the median one, which is definitely post-median in position, is canted slightly dorsad, both in insertion and direction, ventro-caudal margin with a single small distal spine and the remainder of its extent with spaced but regular serrulations, cephalic genicular lobe more strongly spined than the caudal; median femora more compressed, slightly shorter and less robust and crab-like than the cephalic, dorsal spination consisting of a single median series of 5 spaced spines, decreasing in length proximad, genicular lobes with spines subequal in length, ventro-cephalic margin with 4 spaced spines, decreasing in length distad, with a few serrulations indicated between some of the spines, ventro-caudal margin very sparsely and weakly serrulate; caudal femora reaching caudad to apex of abdomen, appreciably compressed, internal face definitely deplanate, external face with a marked medio-longitudinal impressed line, greatest depth at proximal fifth and contained 5 times in the femoral length, tapering distad, ventral line nearly straight, dorsal spination consisting of an interno-median series of 10-11 subrecurved spines, decreasing in length proximad, and a brief, more external distal series of 1-2 shorter spines,[11] while the genicular lobe spines are of subequal length, ventro-lateral (cephalic) margin series of spines 6-8 in number, decreasing in length proximad, ventro-internal (caudal) margin unarmed. Tibiae all appreciably compressed, sulcate to subsulcate on dorsal (extensor) surface: cephalic tibiae with auditory foramina rimate, the partially covering conchae strongly adpressed, dorso-cephalic margin with 2 strong spaced spines,[12] dorso-caudal margin serrulato-undulate, unspined, ventro-cephalic margin with a large median strongly recurved tooth or claw-like spine, and a smaller one distad as well as proximad with a few accessory spinules in these terminal areas, ventro-caudal margin with 5-6 spaced spinules; median tibiae with dorsal margins unspined (except for a single disto-caudal spine in one male paratype), undulate, ventro-cephalic margin with 5-6 spines, of which the median alone is of any considerable size, ventro-caudal margin as the same of the cephalic tibiae; caudal tibiae in the dorso-external margin armed solely with 3 spines in the distal $\frac{2}{5}$ of their length, dorso-internal margin with 8 strong spines distributed over the whole length, ventro-external margin with 8-10 spaced spines, ventro-internal margin with 4-6 spines, almost entirely in the distal half.

---

[9] The exact homology of these appendages cannot be clearly determined without damaging at least one of the very few known males of the genus It is possible they are developments of the eleventh sternite, but future work is necessary on this point.

[10] In a male paratype but 2 are present, the usual distal one lacking

[11] This series is lacking on one caudal femur of one male paratype.

[12] Rarely, in one male paratype, a third smaller, more proximal one is present

Allotype.— ♀; same data as type. [Museum of Comparative Zoology.]

Differing from the preceding description of the male sex in the following noteworthy respects.

Body in general similar, but cephalic and median femora less inflated and less thickened, less crab-like, larger median opposable spines on cephalic and median femora and tibiae less strongly developed.

Pronotum as in male, but elevation of the caudal section of the pronotal disk ("cantle") less sharply subvertical, and the lateral radiating spines on the cephalic margin of the disk are shorter and less pronounced; spination and sculpture of pronotum otherwise as in male.

Tegmina even shorter than in male, not exceeding half the median length of the pronotal disk, their combined width markedly, and individual width appreciably, greater than their length; costal and distal margins and disto-costal angle much as in male, evident portion of sutural margin moderately oblique, nearly straight, disto-sutural angle rounded obtuse; dorsal surface with sole analogy to the remarkable development found in the male consisting of a definite but not excessively developed arcuate tumidity of the discoidal field, this being bullately rounded from the humeral trunk suturad to a sharply (left tegmen) or definitely (right tegmen) marked border, where the surface drops to an area which bears a longitudinal arcuate vein on the left tegmen, which structure as a whole may have some stridulating function, the surface of this portion of the left tegmen somewhat convex independent of the domed discoidal area, the surface of which latter is subcribrosely rugulose. Wings not evident.

Armament of the pro-, meso- and metasterna as in male but less robust, in the case of the meso- and metasterna appreciably less strongly produced.

Tenth abdominal tergite with median membranous area shallow mesad and widely extended laterad, reaching nearly to the vicinity of the cercal bases, not sharply defined, with indication of median glandular pit as in male; supra-anal plate similar to but more rounded trigonal than in male, the intra-marginal impression of its surface more limited than in male, the proximo-median sulcation well marked, cerci short, stout, tapering, apex acute, not incurved or spiniform; infra-cercal plates developed as roughly semi-elliptical subvertical structures with several subobsolete points on their distal border, the whole falling but slightly short of the apex of the supra-anal plate; ovipositor valves in profile tapering, moderately arcuate, subequal in length to the cephalic femora, apex acute, margins entire; subgenital plate quite short, its lateral margins arcuately convergent to a relatively deep median emargination reaching half-way to the base of the plate, U-shaped in the allotype (V-shaped in the female paratype), lateral angles flanking emargination moderately acute.

Limbs as in male except for the following noteworthy difference in addition to those already summarized; dorso-external margin of caudal tibiae with spines numbering 3-5 and in the latter case extending a correspondingly greater difference proximad.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of cephalic femur	Length of caudal femur	Length of ovipositor
♂, Loma Rucillo, *type*....	28	6	3 6	13 3	17 3	..
♂, Loma Rucillo. *paratype*	28 5	6.2	3.26	13	17 3	..
♂, Loma Rucillo, *paratype*	30 5	6.2	3 9	13 7	17 4	..
♀, Loma Rucillo. *allotype*.	32	6.3	2.7	12 4	17 3	13
♀, Loma Rucillo, *paratype*	31	6 5	2.6	12 7	18 7	14.6

Coloration.—Pale base color ranging from cinnamon-buff in the males to tawny-olive in the allotypic female, the present material of the latter sex as a whole darker than the males. Overlying dark pattern ranging from cinnamon-brown to prout's brown or even blackish fuscous in certain areas. Face with whole center solidly and quadrately blackish fuscous, sharply defined, a narrow transverse area immediately dorso-caudad of each antennal fossa marked with the same, the genae usually, and the occiput less frequently, clouded with fuscous; antennae cinnamon-brown to fuscous, in most individuals obscurely and irregularly subannulate with ochraceous-tawny; palpi very pale; eyes russet to umber. Pronotum usually pale dorsad, with the cephalic and caudal margins and their spines generally lined or tipped with blackish fuscous, the surface of the elevated metazonal disk subradiately quadrilineate with fuscous, a more (female) or less (male) evident washing of the same present medio-longitudinally cephalad of that area, lateral discal spines pale in the males, wholly or in part fuscous in the females; lateral lobes of the pronotum ventrad broadly clouded to a variable degree with fuscous. Tegmina of male pale, washed with fuscous intramarginally distad and along the costal side of the humeral trunk, a fuscous dash present on or near the largely concealed stridulating vein; in the female the same relative areas are fuscous and in addition the sub-bulbous area may be more olivaceous and darker than the pale borders. Abdomen with most tergites transversely darkened near the caudal border, this more evident in the male than in the female, tenth tergite marked with fuscous proximad. Femora with pattern of the strumosities accentuated by specklings, clouds and vertical barring of the darker color, producing a marked pantherine appearance, the caudal femora usually well clouded with fuscous pregenicularly, dorsal spines usually and genicular spines always fuscous tipped, larger ventral femoral and tibial spines entirely fuscous or blackish fuscous, smaller ones usually fuscous tipped; tibiae with dorsal spines fuscous tipped; tarsi with third article largely and first and second laterally fuscous. Ovipositor of the color of the abdomen.

Paratypes.—I have examined 2 male and 1 female adults in addition to the type and allotype, and these I am designating as paratypes.

Immature condition.—A single immature female in the instar proceeding maturity has all the identifying characteristics of the adult. The caudal section of the metazonal disk of the pronotum, however, is not at all elevated although it has the marginal spination seen in adults.

Variation.—The sole variation of noteworthy importance not already covered in the preceding discription is that individual spine series on the femora and tibiae may vary from the numbers given to the extent of one or two additional, usually at the more proximal end of the series, and the added ones are almost invariably of small size.

Specimens examined: 6; 3 ♂, 2 ♀, 1 immature ♀.

HISPANIOLA: Loma Rucillo and mountains to the north, Dominican Republic, elevation 5,000-8,000 feet; VI, 1938; (P. J. Darlington); 2 ♂, 2 ♀ (*type, allotype* and *paratypes*); [M. C. Z. and A. N. S. P.]. Loma Rucillo, Dominican Republic, elevation 7000 feet; VI, 1938; (P. J. Darlington); 1 ♂ (*paratype*); [A. N. S. P.]. Valle Nuevo, southeast of Constanza, Dominican Republic, elevation c. 7000 feet; VIII, 1938; (P. J. Darlington); 1 immature ♀; [M. C. Z.].

Spelaeala scobina[13] new species Figs. 5-6, 10.

The preceding key to the species of the genus presents the major differential features which separate *S. scobina* from *S. bondi.* The male sex of *S. scobina* is, as yet, unknown.

Type.—♀; Loma Rucillo and mountains to the north, Dominican Republic, Hispaniola, elevation 8000 feet. June, 1938. (P. J. Darlington.) [Museum of Comparative Zoology.].

The following features are of noteworthy difference from the preceding detailed description of *S. bondi:*

Size slightly smaller than in *S. bondi;* form similar but head and limbs less compressed; surface less strongly spinose, as a whole quite definitely shagreenous on the pronotum and limbs, this indicated, but much less distinctly, on the abdominal dorsum.

Head broader proportionately than in *bondi,* width across genae equal to $\frac{3}{4}$ of head depth, eyes slightly less evident than in *bondi* when seen in cephalic aspect. Antennae incomplete, apparently shorter than in *bondi.*

---

[13] I e *a rasp,* in allusion to the shagreenous character of much of the body and limb integument

Pronotum with surface pronouncedly shagreenous, no prominent spines in the usual position of the lateral carinae, the metazonal section there with numerous low but quite distinct folded or convoluted strumose nodes; cephalic margin of disk with median spine distinct but very much shorter than in the female of *bondi*, the more lateral radiating points on the same margin less sharply spiniform than in *bondi* and with interspersed spinules of a smaller order; caudal more erect portion of metazonal disk as the cephalic margin of disk with lower and more numerous spines with interspersed spinules of a smaller order; lateral lobes with surface between sulci quite strongly shagreenous, the precaudal sulcus much more evident and more deeply incised than in *bondi*.

Tegmina with shape and character much as in *bondi*, but the surface of all except the narrow marginal field is strongly impresso-areolate.

Prosternal spines stouter proximad, more strongly tapering, more diverging laterad and in consequence not as subparallel as in *S. bondi*; mesosternal and metasternal lateral angles essentially as in *bondi*.

Dorsum of abdomen with indications of a median point distad limited to but one or two proximal tergites and of the weakest character; tenth tergite with membranous area similar to but deeper and narrower, and more impressed mesad, than in females of *S. bondi*, glandular spot similarly indicated; supra-anal plate as in females of *bondi* but slightly more semi-elliptical in outline; cerci similar to but slightly shorter and blunter than in female of *bondi*; ovipositor valves as in *bondi*; subgenital plate with median emargination somewhat smaller than in female of *bondi*, in the type broad U-shaped, in the paratypic female more V-shaped.

Limbs as a whole less robust and not as deep as in *bondi*, femora particularly, the dorsal spines on the latter shorter and less pronounced, the ventral spines of the cephalic and median femora also definitely shorter and less decided. Cephalic femora with medio-dorsal spine series 6-7 in number, the distal accessory series 4, ventro-cephalic margin with 3-4 spaced spines, not differing in length and in nearly or quite the same vertical plane, with numerous serrulations interspersed, ventro-caudal margin with 1-2 small distal spines, remainder of margin regularly serrulate; median femora with medio-dorsal series of spines 5-6 in number, ventro-cephalic margin with 4-5 spines and sparsely serrulate between, ventro-caudal margin serrulate only; caudal femora more slender than in *bondi*, greatest depth at proximal fifth contained nearly seven times in the femoral length, with median longitudinal impression on external face as in *bondi*, dorsal spination composed of an interno-median series of 9-10 appreciably recurved spines [14] and a very brief externo-distal one of 2 similar spines, ventro-lateral (cephalic) margin with 7-8 spines, definitely decreasing in length proximad. Tibiae as a whole much as in *bondi*, dorsal margins of cephalic and median ones unspined and with such undulations as are present little evident; cephalic tibiae with ventro-cephalic margin bearing a relatively large, median, hardly recurved, tooth-like spine, at least one smaller spine distad[15] and a definite spinule proximad, ventro-caudal margin with 5-7 spaced spinules, median tibiae with ventro-cephalic margin having 5-7 spines, the median one slightly larger than any of the others which decrease in length progressively proximad and distad, ventro-caudal margin with 5-7 spaced smaller spines, fewer proximad; caudal tibiae with dorso-external margin serrulate, having at most only a single spine (this on one limb of paratype only), ventro-internal margin with 6-7 strong spines, ventro-external margin with 6-8 moderately adpressed spines, ventro-internal margin with 4-7 adpressed spines in distal half.

---

[14] As numerous as 13 on one caudal femur of the paratypic female, the mate of which limb has but 10.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of cephalic femur	Length of caudal femur	Length of ovipositor
♀, Loma Rucillo, *type*....	26.8	5.7	2.77	9.4	14.8	13.4
♀, Valle Nuevo, *paratype*.	28.5	5.8	3.26	10.6	16.1	14.6

Coloration.—Pale base color sayal brown to cinnamon-buff, overlaid with a darker pattern of prout's brown to fuscous. Face without dark maculation except for a pair of short diverging dashes, one ventrad of each antennal base; mandibles, ventral border of genae and clypeo-facial suture fuscous, postocular portion of genae clouded with cinnamon-brown, incomplete annuli of fuscous surrounding eye bases; eyes saccardo's umber to sepia; antennae dresden brown to prout's brown, not annulate, two proximal articles of base color. Pronotum with disk of metazona definitely, of prozona much more weakly and incompletely, infuscate, the former with a caudal radiating disposition of the darker color, leaving pale areas between, and the width of the dark elements varying individually; lateral lobes with tonal depth varying areally, palest ventro-cephalad. Tegmina with marginal field as pale as cinnamon-buff and sharply contrasted with the remainder of the tegmen, vicinity of the humeral trunk broadly and solidly barred with fuscous, which also washes most of the remainder of the tegmen except the more distal section of the sutural border, and the more elevated portions of the bullation of the discoidal field, where the fuscous of the interstices contrasts with the pale buffy of the neurational network. Abdomen prout's brown, paling laterad and ventrad, ovipositor valves dresden brown washed with fuscous dorso-proximad. Limbs of the general colors, in lateral view the femora having a zebroid appearance on account of the heavily rugose sculpture, which is tinted with the darker hue and hence definitely contrasted with the paler color of the more elevated interstices, the tibiae less contrasted but appreciably speckled with the darker tone, larger spines tipped with mummy brown to blackish fuscous.

---

[15] The paratypic female has on one limb 3 more distal spines, decreasing in length distad The other cephalic limb of this individual is missing.

Paratypes.—I have also examined a single female adult, taken at Valle Nuevo, southeast of Constanza, Dominican Republic, at an elevation of about 7000 feet, in August, 1938, by P. J. Darlington, which I am considering a paratype.

Variation.—The paratype is appreciably larger, somewhat more rugose and more strongly spined than the type, and in addition shows differences in the number of spines in certain series. These points have been treated in footnotes scattered through the description of the type.

Specimens examined: 2 ♀.

HISPANIOLA: Loma Rucillo and mountains to the north, Dominican Republic, elevation 8000 feet; VI, 1938; (P. J. Darlington); 1 ♀ (*type*); [M. C. Z.]. Valle Nuevo, southeast of Constanza, Dominican Republic, c. 7000 feet; VIII, 1938; (P. J. Darlington); 1 ♀ (*paratype*); [A. N. S. P]

NOTULAE NATURAE

NUMBER 126 OF SEPTEMBER 28, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW RACE OF AMEIVA FESTIVA FROM COLOMBIA

BY EMMETT REID DUNN

Curator, Department of Reptiles and Amphibians, The Academy of Natural Sciences of Philadelphia

Among some specimens sent me for study a few years ago by my valued correspondent Hermano Niceforó Maria, of the Instituto La Salle in Bogotá, Colombia, was a very odd-looking *Ameiva* which I could not place. I commented on this and asked if more material could be obtained, and last year (1942) he sent me four more from the same locality. After considerable study I have decided to name it as a new race of *Ameiva festiva*, and shall call it, in honor of the man who has done so much to add to our knowledge of the fauna of Colombia:

Ameiva festiva niceforoi new subspecies

TYPE.—A.N.S.P. 24300.

Type locality.—Sasaima, in the eastern Andes, 75 km. northwest of Bogotá, altitude 1200 meters.

Range.—Known only from the type locality. Probably not very extensive, as typical *A. f. festiva* seems widespread in Colombia.

Diagnosis.—A form of *festiva*, identical with it in size, in proportions, and in scalation, but remarkably different in markings. A wide, light, straight-edged, dorsal band (involving 30-34 granules in crosswise count) extends forwards to involve all the parietals and fades out on the head.

Remarks.—In typical *festiva* a narrow dorsal streak starts at the snout. It is vivid on the head, involves only the middle parietal, and becomes less vivid on the body. On the body it has wavy irregular edges, and its width is from 12 to 20 granules in crosswise count. I have seen typical *festiva* from the Truando River in Colombia (type of *eutropia* Cope) and from the "east base of the Cordillera of Bogotá." Possibly other specimens of *niceforoi* from other localities have been recorded as *festiva*.

The type of *festiva* (which I have examined) came from Veragua, Panamá, and I have seen a great many specimens from Costa Rica and from

Panamá. The Sasaima form is very different in color (in fact marked like *undulata* or *leptophrys*), but every detail of scalation is in agreement with *festiva*.

The other four specimens, of various sizes (A.N.S.P. 22784, 24301, 24302, 24303) are essentially like the type.

NOTULAE NATURAE

NUMBER 127 OF SEPTEMBER 30, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW FLYCATCHER OF THE GENUS MYIOPHOBUS FROM PERU

BY JAMES BOND

Associate Curator Birds of the Americas, The Academy of Natural Sciences of Philadelphia

While rearranging the nearly 200 species and subspecies of Tyrannidae from Peru in the collection of this Academy, I came across three specimens of an unnamed form which I propose to call

Myiophobus pulcher oblitus new subspecies

TYPE.—Ad. ♂, A.N.S.P. no. 102909, collected at Oconeque, Dept. Puno, Peru, May 29, 1931, by M. A. Carriker, Jr.

Description.—Resembles *M. p. pulcher* (Sclater) of the Western Andes of Colombia and Ecuador, but pileum dusky brown, with a faint olive tinge, rather than green; dorsal surface olive, not " warbler-green "; basal portion of the third to sixth outer primaries margined with buffy, forming a rather well-developed speculum, these pale edgings being much more circumscribed than in northern races; tail grayish brown, not green; anterior under parts paler ochraceous and the abdomen paler yellow; size larger.

Differs from *M. p. bellus* (Sclater) of eastern Ecuador and from the Eastern and Central Andes of Colombia chiefly in having a darker pileum, olive rather than dull grayish green dorsal surface, paler wing bars, and much paler ochraceous throat and chest; tail decidedly shorter.

The concealed crown patch in *oblitus* varies from mostly yellow (in the type) to orange-red. In all the Colombian specimens before me it is orange-red.

Measurements of type.—Wing (maximum measurement) 57.5, tail 40.5, bill (exposed culmen) 8.5, tarsus 15.5 mm.

Additional measurements.—*M. p. pulcher*, ♂, Rio Michengue, El Tambo, Western Andes of Colombia, wing 52.5, tail 37.5; ♀, Rio Munchique, El Tambo, Western Andes of Colombia, wing 50.5, tail 37 mm.

M. p. bellus, ♂,[1] El Roble (above Fusugasugá), Eastern Andes of Colombia, wing 59.75, tail 45.7; ♂,[1] Aguadita (above Fusugasugá), Eastern Andes of Colombia, wing 58.25, tail 47.5; 3 ♂, Toché, Central Andes of Colombia,[2] wing 57.5, 59, 59.5, tail 45, 45.5, 47 mm.

---

[1] Specimens in the collection of the American Museum of Natural History.

[2] Not hitherto recorded from the Central Andes of Colombia.

M. p. oblitus, 2 ♂, Oconeque, Peru, wing 55.25, 58, tail 40, 42 mm. The Huasampilla (Peru) specimen has a wing of "50" mm. (maximum measurement?), the tail "41" mm (Taczanowski).

Range.—Southeastern Peru, from the Department of Puno (Oconeque) north to the Department of Cuzco (Huasampilla).

Remarks.—This interesting little species of *Myiophobus* had been recorded from Huasampilla, Dept. Cuzco, Peru (Sclater, Proc. Zool. Soc. London, 1873, p. 780 (1874)), but the record was subsequently questioned by Hellmayr (Cat. Birds of the Americas, 5, 1927, p 249) and considered as probably referable to *M. ochraceiventris* (Cabanis). However, Taczanowski's description of the Huasampilla specimen (Orn. du Pérou, 2, 1884, p. 303) agrees very closely with our Oconeque examples. There is a slight discrepancy in regard to the pale margins to the primaries. Taczanowski states that the third to fifth primaries (counting presumably from the outside) have pale margins at their bases. Oconeque males have, in addition, the sixth so marked. The remainder of these feathers is virtually uniformly blackish.

I recently examined an adult male and female of *M. ochraceiventris* in the collection of the Museum of Comparative Zoology, at Cambridge, Mass. These were collected at "Chilpes" (near Maraynioc), Peru. While superficially resembling *pulcher,* they may at once be distinguished by their larger size, and, in particular, relatively long tail. The male has a wing of 68.5, the female a wing of 58.75 mm. (chord measurements). The tail of the male measures 63 mm., that of the female 58.5 mm. The crown patch is yellow in the male, chestnut in the female. As Peters has stated (Bull. Mus. Comp. Zool., 92, no. 4, 1943, p. 315), it is questionable whether this species is rightly placed in the genus *Myiophobus*. In any case it cannot be considered a geographical representative of *M. pulcher*.

NOTULAE NATURAE

NUMBER 128 OF OCTOBER 29, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

PELMATODRILUS PLANARIFORMIS, A NEW OLIGOCHAETE (ENCHYTRAEIDAE) MODIFIED FOR EPIZOOTIC LIFE ON JAMAICAN EARTHWORMS

by J. PERCY MOORE

PELMATODRILUS gen. nov.

Diagnosis.—Elongate elliptiform, strongly flattened throughout, with a very thin marginal membrane. Prostomium short prolobate; somites about 40, the preclitellar most clearly defined and more or less distinctly biannulate. Setae of *Pachydrilus* type; the ventral on all somites except the prostomium, XII, and the pygidium, numerous, mostly in linear fascicles; the dorsal fascicles reduced to a single seta when present. Clitellum dorsal, on somites XII, XI, and XIII. No head pore seen, no dorsal pores, no ventral sucker. Alimentary canal straight, except for an oesophageal flexure and diverticula, probably with chylus cells, at VII; apparently one pair of tubular salivary glands. Dorsal blood vessel not free from perintestinal plexus. Location of reproduction organs as in family. Spermathecae lack bulb and ampullae and open into oesophagus. Paired testes and ovaries both unite in median masses beneath the midgut. No true sperm vesicles. Penial bulb of *Lumbricillus* type with two kinds of gland cells. Preseptal part of nephridia consists of the funnel and a small part of the plexus, post-septal plexus large. Muscular layers of body wall consist of a thin course of circular fibers with the longitudial muscles mostly in loose bundles projecting deep into the body; dorso-ventral muscles highly developed and as sheets and strands largely filling, along with connective tissues, the strongly flattened regions laterad of the circumintestinal coelom. Dissepiments thin muscular and endothelial sheets. Septal glands on III/IV, IV/V, V/VI. Genotype *P. planariformis* sp. nov.

Pelmatodrilus planiformis sp. nov.

Description of Type, the most mature specimen.—Length 7.4, to end of clitellum (XIII/XIV) 3.2, width at XII (maximum) 1.25, at XX 1.1, depths at same points about .3 and .2 mm. Form strongly flattened throughout, elongated, oblong elliptical, the ends broadly rounded, the caudal with a slight anal notch, greatest width at the clitellum, about the level of the ♂ pore, but little change in width for most of length. Number of somites

42, counting the pygidium as one. Prostomium prolobate, broadly rounded and nearly as long as the peristomium from which it is completely delimited by a well-marked dorsal furrow; its surface studded with small scattered sensory papillae of hay-cock shape. Peristomium a well-defined, somewhat wrinkled and ventrally scalloped, uniannulate, achaetous ring, also bearing sensory papillae. Preclitellar region somewhat less flattened and less modified than post-clitellar, slightly more tapered, the somites relatively large and distinct, more or less biannulate on the dorsum, especially II to VI or VII inclusive. Spermathecal pores in the furrow IV/V slightly dorsal of the margin. Clitellum a thick glandular layer covering the entire dorsum of somites XI, XII and XIII, thinning toward the ends of XI and XIII; in surface views appearing finely reticular owing to the regular spacing of clear gland cells. ♀ pores and nephropores not seen in surface views; ♂ pores conspicuous openings situated latero-ventrally on the caudal half of XII, with a thick lobulated mass of partly everted epidermal glands on the marginal side. Post-clitellar region actually and relatively much flatter, with the margins nearly parallel for most of the length; dorsum slightly convex and venter concave transversely. Somites defined externally chiefly by the setae bundles, the intermetameric furrows being very shallow and the interannular furrows obscured by 8 circular muscle bands reduced to 6 caudally where the somites become increasingly both shorter and narrower to the pygidium. In the caudal half the median dorsal field is slightly elevated as a rounded ridge and on each somite a pair of low lateral ridges extend nearly to the margins opposite the setae tracts. On the venter a narrower neural ridge extends for nearly the entire length of the post-clitellar region between the inner ends of the setae tracts. Probably all of these ridges are artifacts due to the contraction of the dorso-ventral muscles under the stimulus of the killing agent, against which the intestine in the median field and the setae fascicles in the lateral fields offered greater resistance. At the caudal end the much smaller somites become progressively more curved caudo-marginally, the last one or pygidium being doubled on itself and thickened at the margin to form a slit or notch into which the anus opens surrounded by a circle of 6 low, rounded papillae of which the median pair are the smallest. Marginal membrane a delicate web, traces of which begin at somite VI or VII and continue to the anal notch; anterior to the clitellum it is very narrow and attains its full width of about .04 mm. at XIII and so continues to the caudal end, with slight emarginations or infoldings at the intersegmental furrows, which permit its adjustment to changes in length of the worm. Dorsal fascicles limited to one seta which is borne in a small papilla in a dorso-marginal position about $\frac{1}{7}$ of the total width from the margin and just within the cephalic half or annulus of the somite. On the type specimen these papillae are usually visible on most somites except the peristomium, the three clitellar and several at the caudal end, and are distinguished from associated sensory papillae by a dark brown circular spot in the center which is supposed to be the usually broken seta. Ventral setae fascicles highly developed on all somites except the prostomium, XII and the pygidium. On preclitellar somites they cover about $\frac{1}{2}$

of the distance from the median line to the margin and are separated medially by the neural ridge. The tracts have an elongated elliptical form in which the setae appear in two well separated ranks with a few between in an irregular incomplete third rank. Post-clitellar fascicles are more extended, some of those around XXX reaching almost to the margins, and of very narrow almost linear form, with numerous setae disposed in two very regular and closely approximated ranks. In surface views the setae appear very distinctly as brownish dots and are easily counted, with sometimes a little uncertainty owing to the presence of a few immature reserve setae. The number in each fascicle of II is 16, III 18, X 20 and 22, XX 24, to a maximum of 30 on XXX to XXXII, declining to 20 on XXXV, 18 on XXVII and a more rapidly diminishing number on the last three somites. On post-clitellar somites it is very obvious that the setae of the two rows are alternate and staggered. Ventral setae large with slightly curved pointed tips. (See below for fuller description of shape and arrangement as seen in sections.)

Anatomy.—While the type specimen is the most mature and exhibits the external characters most satisfactorily, the clitellum is so extensively developed that it conceals the reproductive organs. For this reason and also because it was fixed with chromic acid and cannot be satisfactorily stained and cleared the following brief description of internal anatomy is based chiefly upon two entire examples killed in Bouins fluid and a series of sections. The digestive tract conforms to the generally simple characteristics of the family but presents the following features of interest. The lumen of the buccal chamber is trifid due to a dorsal longitudinal groove and a corresponding ventral ridge; the main lumen consisting of a pair of transverse crescents, convexities ventrad, which meet medially in the dorsal groove continuing the median ventral furrow of the prostomium. Following this is a constricted section which passes into the wide pharynx almost filled by the large, somewhat quadrate, thick, glandular dorsal pad which in retraction lies mostly in somite III and is divided by 3 or 4 longitudinal furrows into 4 or 5 glandular ridges. When everted, as in the type, it is a broad, flat, truncate body projecting beyond the prostomium on all sides. Salivary glands appear to be only one pair of simple tubes lying at the sides of the pharynx and oesophagus in III and IV and probably opening in II. Also attached to the sides of the caudal end of the pharynx in IV is a pair of small, deeply-staining solid bodies the nature of which is undetermined. Oesophagus a narrow tube beginning in IV and ending at the midgut in VIII. In VII, and in some specimens extending more or less into VI and VIII but differing somewhat in each specimen, is an abrupt and deep flexure usually s-shaped and more or less transverse, but in one specimen longitudinal with an anterior and a posterior loop reaching into VI and VIII, respectively. This entire region has the lumen almost obliterated by large ciliated epithelial cells which are probably chylus cells although the characteristic structure was not determined with certainty from the sections. This region seems invariably to bear two bulbous diverticuli which differ in shape and size and in none of these specimens are they symmetrically paired. The midgut begins in VIII and is normally moniliform, composed of wide more or less irregularly-lobed chambers with constrictions at the septa, but in two specimens there intervenes a stomach-like enlargement, in one case reaching to XI, in the other to XIV, before the characteristic moniliform intestine begins. This continues to somite XIX or XX where the intestine becomes abruptly narrower, and while the moniliform character persists, it is much fainter and becomes increasingly so as the gut tapers to the anus. A few chlorogogue cells occur as far forward as IV and become numerous in VIII, continuing plentifully to near the caudal end. The vascular system is highly developed only as the peri-intestinal plexus with many small bulbous diverticulae and a few accessory vessels, the dorsal vessel being nowhere completely free, though there appears to be a "heart body" for a short distance in IX and X. Within the limitations of the family the reproductive organs present a few features of interest. Spermathecae tubular, entirely without bulb or ampullae opening into the very narrow oesophagus in somite V and with a conspicuous rosette of glands surrounding the dorsolateral orifice in the furrow IV/V. Testes in X, conjoined across the nerve cord and forming dense lobulated masses of developing sperm cells beneath and at the sides of the intestine to the septum X/XI. Apparently no true sperm vesicles, but free spermatozoa in the coelomic spaces as far forward as somite VII. Sperm funnels at septum X/XI, the preseptal part opening into X very small, the post septal portion very large, a cylindrical column of high columnar, probably glandular, cells which when mature extends nearly the length of the segment and in some cases exceeds the diameter of the gut at the same level; cells on the ventro-lateral aspect are clear, elsewhere granular. Sperm duct long and much coiled by the sides of the intestine in the cephalic half of XII, then passing directly to the dorsal face of the penial bulb which it penetrates and opens into the epidermal invagination about half way down its medial side. Penial bulb globoid, compact, composed of two kinds of gland cells, smaller, more deeply staining ones at the opening of the sperm duct and larger, lightly staining ones in the deeper part. On the lateral side of the bulb is a deep slit-like invagination of the outer epithelium which is much thickened and somewhat lobulated on the ventral part of the marginal wall and forms the furrowed gland flanking the ♂ pore of mature worms. Like the testes, the ovaries are united in a common mass beneath the intestine beginning at the caudal face of the septum XI/XII and extending to about the middle of somite XII. Ovipores ventral in the furrow XII/XIII. Nephridia begin at septum VI/VII, the preseptal portion consisting of the nephrostome and a small part of the plexus, the post-septal a rather large and compact plexus mass. Muscular layers of body walls composed of a thin layer of circular muscles and a thicker but open, and at places discontinuous, layer of longitudinal muscles. In the post-clitellar region the latter is relatively thin on the venter but on the dorsum is constituted of deep, loose, open bundles which extend far into the body. Dorso-ventral muscles are strongly developed as sheets and strands which with connective tissues largely fill the coelom laterad of the oblique sheets of muscle which bound the circum-intestinal coelom, especially in the strongly flattened post-clitellar region where the appearance greatly resembles that of flattened leeches. Supra-oesophageal ganglion deeply cleft anteriorly, rounded posteriorly. The three pairs of septal glands in IV, V and VI are dense lobulated bodies which unite across the median line.

Notes on Paratypes.—Six specimens measure in mm. from 3.2 x .6 to 8.6 x 1.8, the difference in size and proportions being due partly to age and partly to different degrees of contraction under the influence of the killing agents. The sectioned specimen permits a more accurate measurement of the depth than the entire ones. At somite V the width and median depth are .57 and .16 mm., a ratio of 3.5:1 and at XXIV .83 (exclusive of the marginal membrane) x .13 mm., or 6.4:1. The smallest has 31 somites, the others from 37 to 40 and the number of setae increases somewhat with maturity. Only two are sexually mature. One of these was sectioned before measuring; the other measures 8.6 x 1.8 and has 40 somites, with the gonads less active than in the type and the clitellum extending over, besides all of XII, only the caudal $\frac{1}{3}$ of XI and the cephalic $\frac{2}{3}$ of XIII. Another measuring 7. x 1.5 with 39 somites is far from mature.

The sections add much to our knowledge of the setae although many are broken. Of dorsal setae only two were seen that appear to be intact. These are on somites II and VIII and are about half as long and much more slender than the ventral setae. In the position presented they appear almost straight and taper to the acute slightly curved tip. Ventral setae in each fascicle are really at the base in only one row, but by means of their individual protractor and retractor muscles they are divaricated alternately forward and backward like the legs of a rank of marching soldiers. The ventral setae are large (0.13 mm. long), slightly s-shaped, without nodules, and with the tip curved and acutely pointed. In some cases there appears a fuzziness at the curve below the point which occasionally looks like a delicate half-collar or guard, such as occurs on the uncini of some polychaetes. As the setae in the sections are never seen in complete profile the exact form of the tips is somewhat problematical, but it is certain that there is no definite spur or bifurcation.

For the opportunity to study this material I am indebted to Dr. John B. Buck, of the University of Rochester, who very kindly turned over to me the entire eight specimens collected by him in 1941 and generously has presented the type to the Academy of Natural Sciences of Philadelphia. The little worms live as epizoons on the surface of apparently two species of large earthworms (not yet fully identified) found under rocks at an elevation of 4900 feet at Morces Gap in the rain forest about five miles west of Blue Mt. Peak, Jamaica. They are known to occur in other nearby gaps also. Dr. Buck writes that the blood is colorless and that the living worms are white and look more like planarians which he at first thought them to be. Mr. Ivan T. Sanderson also found these worms at the same place and thinking them to be planarians gives a lively account of their appearance and movements (Living Treasure, 1941, p. 43).

These worms, so greatly modified from the ordinary enchytraeid form, are wonderfully well adapted to their mode of life. Their extreme flatness, to paper thinness in the post-clitellar part, together with the still thinner marginal membrane which seals the edges against the entrance of earth particles, fits them so closely to the surface of the host that they offer no resistance as it moves through the moist earth. In addition the numerous large hooked setae arranged in serried ranks enables the worms to cling to the mucous covering and cuticle and by virtue of the marching movement of the setae to affect just the gliding movement observed.

Nothing is known of the exact relation of *Pelmatodrilus* to its host nor anything of its life history. As this is the chief interest of the worm, Dr. Buck and I hope to secure sufficient living material to make a complete study and to publish a joint paper fully describing the anatomy and as much of the life history as can be worked out. Dr. C. Bernard Lewis, Curator of the Museum of the Institute of Jamaica, who is familiar with the worm, has generously offered his assistance. As, owing to existing transportation and other difficulties, there may be considerable delay, it seemed best to publish this preliminary account.

Several enchytraeids living more or less definite epizootic lives are already known. Three of these affect earthworm hosts. *Fridericia parasitica* Cernosvetov (1928) described as an ectoparasite on *Allolobophora robusta* in Yugoslavia is little modified. Except for the attenuation of the caudal third, the slight flattening of a few extreme caudal segments, and an increased number of ventral setae, it is essentially like any free living *Fridericia*. *Aspidodrilus kelsalli* Baylis (1914) lives on the surface of a large earthworm in Sierra Leone, West Africa, and is described as merely a rider on its host, feeding on organic contents of the soil. It has much the appearance of *Pelmatodrilus* and has some similar adaptations, the strongly flattened discoid post-clitellar region, the marginal membrane, the increased number and arrangement of the ventral setae, besides many resemblances not connected with epizootic life. But the two genera differ in many respects. *Pelmatodrilus* is flattened throughout, whereas the first 12 somites of *Aspidodrilus* are cylindrical and unmodified. As compensating for this the latter has an adhesive disc or sucker on somite XII giving greater security of attachment at that critical point. *Aspidodrilus* has no dorsal setae and the ventral are fewer and straight, but it has special setae on XII (Michaelson 1926) which *Pelmatodrilus* lacks. *Pelmatodrilus* also has spermathecal openings into the oesophagus and epidermal invaginations in association with the penial bulb, both of which *Aspidodrilus* lacks.

NOTULAE NATURAE

NUMBER 129 OF OCTOBER 29, 1943

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE OCCURRENCE OF CERCARIA CLAUSII MONTICELLI, A MARINE RATTENKÖNIG LARVAL TREMATODE, ON THE WEST COAST OF FLORIDA

by R. M. CABLE[1] and RICHARD A. MCLEAN[2]

Introduction

In March 1942, several specimens of the marine prosobranch gastropod, *Lamellaria leucosphaera* Schwengel, were taken on tide flats off Red Fish Pass, Captiva Island, Florida, by Mrs. Carl S. Miner and later by Mrs. Frank R. Schwengel. The snails were placed in salt water aquaria and, on the following day, were seen to have given off numerous small white objects which the collectors supposed to be germinal elements or embryos of the mollusks. Several of these objects were preserved in 70% alcohol and sent to the junior author, along with some notes, sketches, and photographs of the living material. Upon examination, the objects proved to be larval trematodes of the "*Rattenkönigcercarie*" type which was first described by Claus (1880) and later regarded by Leuckart (1886), Lühe (1909), and others as a distinct larval type in various classifications of trematode larvae.

To our knowledge, only two species of *Rattenkönig* cercariae have been described to date: *Cercaria gorgonocephala* Ward, from freshwater; and *C. clausii* Monticelli, a marine form. Ward (1916) described *C. gorgonocephala* from a single rosette taken in Lake Erie with a plankton net; since this species has not been reported again, its molluscan host is unknown. *C. clausii* was discovered at Naples by Claus (1880) for whom the species was named by Monticelli (1888). Monticelli's description was extended by Pintner (1892) who found the cercariae in the prosobranch gastropod, *Trivia europaea*, collected at Rovigno on the Adriatic Sea.

Because of the supposed absence of a pharynx in *C. clausii*, Odhner (1911) suspected this cercaria to be the larva of the marine gorgoderid, *Phyllodistomum acceptum* Looss. He apparently did not attempt to demonstrate the life history experimentally but postulated that the cercariae were united in clusters to attract the attention of fishes serving as definitive hosts. He claimed to have observed in the hind-gut of *Chrysophrys aurata* all intermediate stages up to small, immature distomes about 0.5 mm. long.

---

[1] Associate Professor of Parasitology, Purdue University.

[2] Assistant Curator, Department of Mollusks, The Academy of Natural Sciences of Philadelphia.

The *Rattenkönnig* cercaria from Florida resembles *C. clausii* very closely as will be seen below. Although we were unable to obtain living material, the rarity of this type of cercaria seemed to warrant at least a brief study and a consideration of possible relationships in the light of recent life history studies.

Materials and Methods

We are indebted to Mesdames Carl S. Miner and Frank R. Schwengel for preserved cercarial rosettes and infected snails as well as notes, observations, photomicrographs, and motion pictures of living cercariae. Several pencil sketches made by Mr. J. N. Darling and his observations conveyed in personal communications have been very helpful. Preserved cercarial rosettes were studied as stained whole mounts and two infected snails were sectioned to observe developmental stages and morphology of the parasites.

Observations and Discussion

The striking similarity of the cercaria from Florida to *C. clausii* is shown in the following specific diagnosis in which some of Pintner's (1892) observations and measurements are included in parentheses. There is exact agreement in all of the following characteristics which are not followed by parenthetic statements. All measurements are in millimeters.

Cercaria clausii Monticelli, 1888 Figures 1-8

Specific Diagnosis.—Marine. binoculate, distome cercariae with distal ends of tails united to form clusters containing as many as 30 (10-20) individuals. Body spinose (finely granular), ventral surface of fore-body with prominent transverse rows of spines (annulations); with or without conspicuous pigment, both light and dark individuals occurring in the same cluster. Length of body moderately extended 0.2-.26 (0.2); maximum body width 0.04-.048 (0.045). Tail with wide proximal region narrowing abruptly to a slender thread (0.003 wide) and terminating in a small knob up to 0.018 (up to 0.023) long and up to 0.01 (0.013) wide. Tails of cercariae in rosette united by slender thread-like portions forming a tangled knot at one side of which the terminal knobs appear as a grape-like cluster. Proximal part of tail 0.4-.5 (0.6-.7) long and 0.04-.05 (0.071) wide; provided with numerous hair-like processes which become shriveled and indistinct in preserved material. Oral sucker 0.038-.041 (0.036-.045) in diameter, set off by a very narrow, characteristic constriction of the fore-body. Length of ventral sucker 0.033-0.036 (0.032); diameter of eye-spots

0.011. Prepharynx long; pharynx posterior to eyespots, 0.014 long and 0.011 wide (pharynx not mentioned). Number of cephalic glands not determined (two pairs). Excretory vesicle thick-walled, Y-shaped with short arms (figured as sac-shaped and described as filling the hind-body when distended, becoming a narrow canal when contracted). Develop in simple elongate daughter rediae in marine prosobranch gastropods.

Host.—*Lamellaria leucosphaera* Schwengel (*Trivia europaea*).

Locality.—Gulf coast of Florida (Mediterranean and Adriatic Sea).

From the above diagnosis, it appears that the Florida species and *C. clausii* differ in only two respects that may be significant, viz., the shape of the excretory vesicle and the presence of a pharynx. Since the arms of the Y-shaped vesicle are short, it is likely that the vesicle would appear sac-shaped when distended. The pharynx would escape notice in such a heavily pigmented species unless a special search were made in sectioned specimens. Since it has been shown repeatedly that different species or even genera of adult trematodes may have cercariae that are almost identical, a precise morphological study of living material or determination of the life history might reveal specific differences between *C. clausii* and the cercaria from Florida. However, in view of the number of trematodes known to occur in hosts indigenous to both European and American coastal waters, it is quite possible that these larvae represent a single widely distributed species. We accordingly identify the cercaria from Florida as *C. clausii.*

We have been able to observe some aspects of the behaviour of *C. clausii* in motion pictures provided by Mrs. C. S. Miner. At times, the tails in a rosette contract rythmically and in unison (Figs. 1 and 2); at others, the members of a cluster move independently and with great vigor, much as if attempting to pull loose from the mass. Although actual separation of individual cercariae from clusters probably is rare, as a rule, the cercarial bodies become detached as the rosette ages, leaving the cluster of tails more or less intact (Fig. 2). Pintner (1892) described similar phenomena and stated that the rosettes moved actively for 1½ to 2 days before decaudation occurred. According to him, they did not move in any particular direction but darted here and there, suspended in the water. In a personal communication, Darling states that the Florida cercariae move toward the light, clusters traversing a 6-inch bowl of water in less than a minute. Very likely, the age of the cercariae influences behavior, as is true of other species.

Sections of two infected specimens of *Lamellaria* sp. show that the gonads had been almost completely destroyed by the parasites. Portions of the liver and spaces around the intestine and kidney also were invaded.

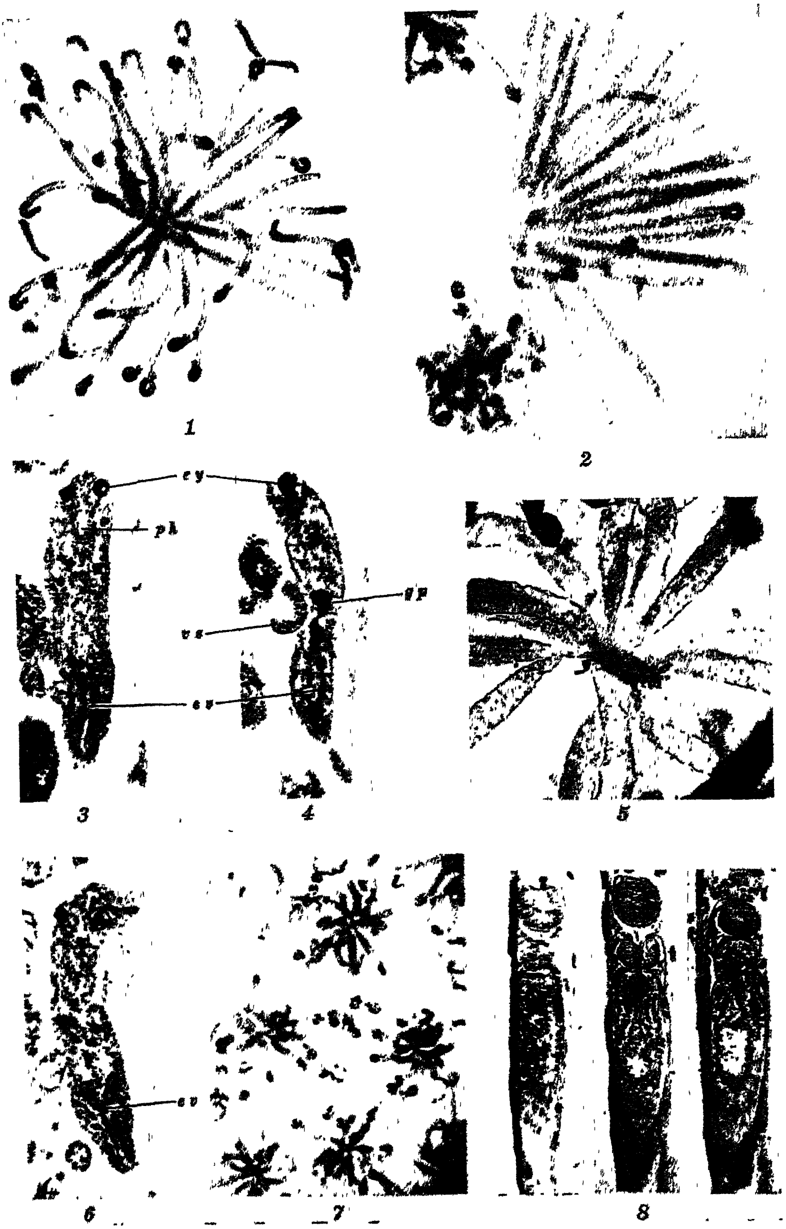


Plate I.

(Explanation at bottom of p. 5.)

Although large daughter rediae may contain many cercariae and germ balls, there was no evidence whatsoever that the cercarial rosettes are formed either in the redia or soon after the larvae escape from the redia. Hence it seems that rosette formation occurs shortly before or at the time the larvae escape from the snail. It is well known that many types of cercariae accumulate in the mollusk and may escape periodically in large numbers, frequently along with the host's feces or mucus masses. Many photographs (Fig. 7) of the Florida material showed individual cercariae that apparently had escaped singly from the molluscan host. In view of the structure of *C. clausii*, the formation of clusters in an accumulation of active cercariae is quite understandable. Since the tail terminates in a knob preceded by a very thin, thread-like portion, it would be expected that cercariae crowded together would become entangled as they move through the mass. Since it is very difficult to separate individual cercariae from a rosette, once it is formed, there must be a tendency for the slender portions of the tails to twist about one another when they come in contact. There is not an actual fusion of the tails at the center of the rosette, but a tangled knot between the expanded proximal portions and the cluster of terminal knobs (Fig. 5).

In the sectioned snails, large numbers of very young rediae were found scattered throughout the body. The source of these was determined to be mother rediae (Fig. 8) occurring chiefly in the mantle of the snail. All mother rediae observed were but little larger than the daughter redia which is produced one at a time. No trace of the miracidium-mother sporocyst was recognized.

The matter of specific identity of larval trematodes is of less significance than the determination of their life histories and relationships. Since the

---

EXPLANATION OF PLATE I

(All figures are unretouched photomicrographs and concern *Cercaria clausii*. Figs. 1, 2, and 7 are from negatives furnished by Mrs Carl S. Miner)

Fig 1. Living rosette, cercariae extended. Fig. 2 Cluster of tails from which most of the bodies have become detached; and (lower right) a living rosette of contracted cercariae. Fig. 3 Cercaria, frontal section showing pharynx. Fig. 4. Cercaria, sagittal section showing genital primordium and ventral sucker. Fig. 5. Center of a cercarial rosette showing the grape-like cluster of terminal knobs of the tails (from a stained whole mount in balsam). Fig. 6 Cercaria, frontal section showing the Y-shaped excretory bladder. Fig. 7. Instantaneous photograph of several living rosettes showing the cercariae contracting independently rather than in unison. Fig. 8. Three consecutive sections including most of a mother redia with its enclosed daughter redia.

ABBREVIATIONS — ev, excretory vesicle; ey, eye-spot; gp, genital primordium; ph, pharynx; vs, ventral sucker.

Rattenkönig cercariae are the rarest of all known types of larval trematodes, either their adult stages constitute a small but distinct family or the larvae themselves are aberrant relatives of some of the better known types of cercariae. Several facts indicate that the latter view may be substantiated by life history studies. In the first place, the two known species of *Rattenkönig* cercariae, *C. clausii* and *C. gorgonocephala,* differ in a number of apparently fundamental respects; this suggests that rosette formation does not indicate close affinity, but instead, a larval adaptation that may have developed independently in distantly related groups. One may cite parallel examples, such as caudal rudimentation and loss in the Microphallidae and Harmostomidae and the cystocercous larvae of the Gorgoderidae and Azygiidae.

Odhner's (1911) supposition that *C. clausii* is the larva of *Phyllodistomum acceptum*, is untenable, since this cercaria is now known to be pharyngeate and has little in common with typical gorgoderid larvae which are cystocercous and develop in bivalve mollusks, chiefly the Sphaeriidae. Although *P. acceptum* is typically gorgoderid in structure, to our knowledge, it is the only marine representative of its genus. We suspect that this parasite may be obtained by marine fishes that migrate into fresh or brackish water where there are the types of bivalves that are known to serve as molluscan hosts of gorgoderid cercariae.

Of the many types of larval trematodes, *C. clausii* resembles most the binoculate trichocercous cercariae whose adult stages are members of the family Lepocreadiidae. Both develop in simple rediae in prosobranch gastropods, have well-developed oral and ventral suckers, eye-spots, thick-walled excretory bladders, and trichocercous tails. These similarities indicate that the adult stage of *C. clausii* may be found among fish parasites belonging to the family Lepocreadiidae or the apparently closely related and aberrant family Gyliauchenidae. Although sac-shaped or tubular excretory vesicles are characteristic of almost all lepocreadiids, it should be noted that the genus *Allolepidapedon*, like *C. clausii*, has a Y-shaped vesicle with short arms. According to Yamaguti (1940), the main excretory tubules of *Allolepidapedon* enter the stem of the vesicle and not the arms, as in most trematodes with Y-shaped vesicles.

Summary

A *Rattenkönig* cercaria, identified as *C. clausii* Monticelli 1888, is described from the marine prosobranch gastropod, *Lamellaria leucosphaera* Schwengel. The presence of a pharynx, together with other morphological features and host-parasite relationships indicate that it is not the larva of

Phyllodistomum acceptum, as has been claimed, but is more likely related to th binoculate trichocercous cercariae. Apparently fundamental differences between the two known species of *Rattenkönig* cercariae suggest that rosette formation does not indicate close affinities but is a larval adaptation that may have arisen independently in distantly related groups.

BIBLIOGRAPHY

CLAUS, C. 1880. Grundzuge der Zoologie, I. Marburg.

LEUCKART, R. 1886. Die Parasiten des Menschen und die von ihnen herruhrenden Krankheiten, II Aufl. Leipzig u Heidelberg.

LUHE, M. 1909. Parasitische Plattwurmer. Susswasserfauna Deutschlands, XVII.

MONTICELLI, F. S. 1888 Saggio di una morfologia dei trematodi. Napoli.

ODHNER, T. 1911. Zum naturlichen System der digenen Trematoden IV. Zool. Anz, XXXVIII, pp. 513-531.

PINTNER, T 1892 Ueber *Cercaria clausii* Monticelli. Arb Zool. Inst. Univ. Wien, XI, pp. 285-294.

WARD, H. B 1916 Notes on two free living larval trematodes from North America. Jour. Parasitol, III, pp. 10-20

YAMAGUTI S 1940. Studies on the helminth fauna of Japan. Part 31. Trematodes of fishes, VII. Jap. Jour. Zool., IX, pp. 35-108.

NOTULAE NATURAE

NUMBER 130 OF APRIL 28, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTION OF A NEW GENUS AND SPECIES OF APOGONID FISH FROM NEW JERSEY

by HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

The fish described below was received from our valued correspondent in Ventnor, New Jersey, Mr. Carroll B. Atkinson. It is of exceptional interest not only as a new genus and species with interesting affinities, but as introducing to the New Jersey fish fauna a family (*Apogonidae*) not hitherto found within the limits of the state.

MIMOCUBICEPS new genus

TYPE.—*Mimocubiceps virginiae* new species.

Body elongately ellipsoid, well compressed, forming a compact contour. Head large, deep, well compressed. Snout short, convex, with its front end formed well below level of pupil. Eye large, within front half of head, elevated, edge free all around. Mouth small, terminal, and with closed lower jaw slightly protruded in front. Premaxillaries well protractile. Maxillary short, reaches only slightly behind front of eye, and hind end but little expanded. Teeth very minute, pointed, in narrow band, at least in front jaws. Dentition not made out on palate. Nostrils close together, above upper front edge of eye. Interorbital moderately broad, little elevated. Bones of head entire or without serrae. Opercle without distinct or projecting spines. Gill opening large, deep, extends forward opposite middle of eye. Gill rakers moderate, short points. Body and head more or less compactly scaled. Scales ctenoid, short apical denticles 4 to 8, short basal radiating striae 5 to 7, and few coarse circuli mostly basal. Head scaly, except muzzle and broad preopercle flange. Low basal scaly sheaths along dorsals and anàls, and caudal base scaly. Scales little smaller on predorsal, chest, breast and prepectoral regions. Lateral line distinct, well elevated, arched up close to profile of back, dropping on side of caudal peduncle to finally become median at caudal base. Dorsal fins connected, with spinous fin slightly higher and with longer base. Anal with 3 spines in front, similar to soft dorsal and its base much longer than length of caudal peduncle as measured along its lower edge. Caudal damaged (not clearly made out), evidently forked and apparently shorter than head. Pectoral longer than ventral, when depressed reaches back as far as vent. Ventral inserted little behind pectoral base, also reaches vent as depressed. Color pale, variegated with 7 dark transverse bands and fins largely uniform.

This genus approaches *Erythrobussothen* Parr[1] in general appearance. It differs in many details, as my specimen has a greatly larger eye, a different disposition of the scales, the presence of a basal dorsal and anal band of scales, bones of the head with entire edges, the maxillary without scales, closed lower jaw slightly protruded, the wide opercular flange, smaller mouth, longer bases of soft dorsal and anal fins, soft dorsal base shorter than soft anal base, more numerous anal rays, larger paired fins, very short gill rakers and the banded coloration. Olsen's figure of *Erythrobussothen*, as published by Parr, is without indication of nostrils, nor are they noticed in Parr's description.

(*Mimus* an imitator + *Cubiceps*, a genus of Stromateid fishes to which this fish bears a superficial resemblance.)

Mimocubiceps virginiae new species

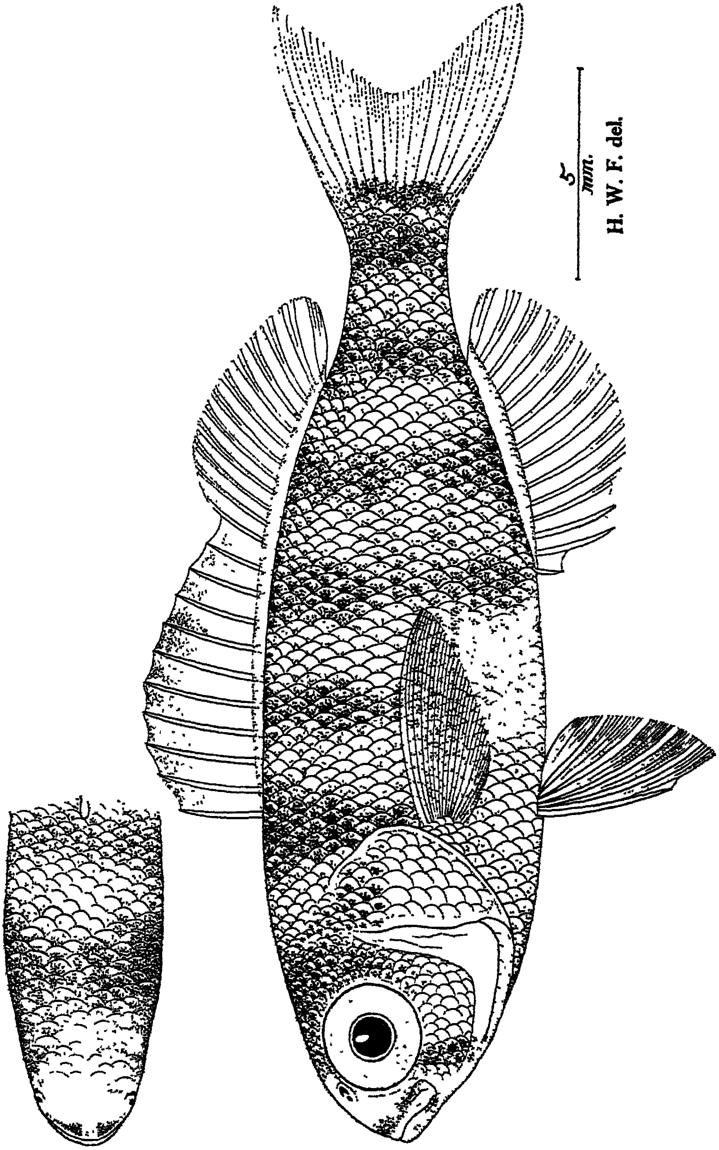
Depth $3\frac{1}{6}$; head $2\frac{9}{10}$, width 2. Snout (in profile) 6 in head as measured from its front end, its front profile evenly and well convex; eye 3, greatly exceeds snout in length and subequal with interorbital width; mouth inclined, cleft slightly arched, shallow lower jaw when closed but little projecting in front; maxillary length 5 in head as measured from tip of snout and extended but little below level of eye; lips narrow, smooth; teeth simple, conic, erect, uniform. fewer and less distinct along sides of jaws; interorbital width 3, broadly and evenly convex; flange of preopercle broad. Gill rakers about 4 + 10, low, robust, conic points, greatly less than gill filaments, which equal about $\frac{1}{2}$ of eye.

Scales 44 + 3? in lateral line; 3 above to base of first dorsal spine, 2 above to base of first dorsal ray; 5 rows on cheek to preopercle ridge; 10 predorsal scales forward to occiput and others still forward till opposite front of eyes. Band of scales along bases of dorsals and anals little distinct, without any dark pigment and formed of only 1 or 2 rows. but band on caudal base with 3 rows. Apparently no pointed axillary ventral scale. Tubes in lateral line small, simple, little exposed.

D. X, 12, last ray split, fourth spine $2\frac{1}{2}$ in total head length, fourth ray $2\frac{1}{2}$; A. III, 11, third spine $3\frac{1}{3}$. fourth ray $2\frac{1}{4}$; least depth of caudal peduncle $3\frac{1}{4}$; caudal lost, though several fragments of rays suggest it as shorter than head and evidently emarginate or forked; pectoral $1\frac{2}{3}$ in total head length, rays I, 15; ventral rays I, 5, fin $1\frac{2}{3}$.

---

[1] Bull. Bingham Oceanog. Coll., vol. 3, art. 6, Dec. 1933, p. 3. Type *Erythrobussothen gracilis* Parr, monotypic; p. 32, fig. 14 (type locality, Bahamas, in depth of 5000 feet).



Mimocubiceps virginiae new species.

Color when fresh in alcohol very pale or light brown generally. Muzzle, except front end of snout, opaque creamy white and conspicuously contrasted with rest of head. Iris and most of opercle bright shining silvery white. Also silvery white peritoneum shows through thin lower walls of abdomen. A patch of dull brown made up of spots as one on each scale exposure on front of cheek. On head and body 7 transverse slightly darker bands than body color, made prominent by means of darker spot on each scale exposure. There are, however, other similar though much lighter brown spots within the pale intervals. Caudal with transverse dark basal band. Dorsals grayish terminally, other fins all more or less pale to whitish.

A. N. S. P., no. 70,616. Ventnor Beach, New Jersey. 1943, probably on August 15. Carroll B. Atkinson. Length 23 mm. to end of broken caudal. Type.

Mr. Atkinson writes me that this fish was picked up on Ventnor Beach near his home, sometime during the past mid-summer or between July 5 and September 15, most likely on August 15. No other fishes or marine animals were found with it.

Parr's description of *Erythrobussothen gracilis* gives " D. X, 11 " and Olsen's drawing he publishes shows D. X, 9 (last ray split); 6 scales between the origin of the dorsal fin and the lateral line; gill rakers 5 + 15; color in life bright pink (according to figure would appear uniform); about 50 scales in a longitudinal series (47 tubular scales shown on drawing to caudal base); snout computed as 4 in head on Olsen's figure, eye 3⅓, maxillary 2¼ and scaly; scales shown by Olsen as arranged in longitudinal rows parallel with lateral line both above and below (in very distinct parallel horizontal rows below lateral line in *Mimocubiceps*).

(Named for Mrs. Carroll B. Atkinson.)

NOTULAE NATURAE

NUMBER 131 OF APRIL 28, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE GENERA APLATACRIS AND THRASYDERES (ORTHOPTERA; ACRIDIDAE; ROMALEINAE; TROPIDACRES)

by JAMES A. G. REHN

Curator, Department of Insects, The Academy of Natural Sciences of Philadelphia

The genus *Aplatacris* was described by Scudder in 1875,[1] based on the species *A. colorata* from Andean Peru. I. Bolívar's genus *Thrasyderes* was established in 1881 [2] on the single species *T. leprosus* from Chile. Bolívar contrasted his genus with *Titanacris* and *Lophacris* Scudder and *Prionacris* Stål, but made no comparison with *Aplatacris.* In 1887 Pictet and Saussure [3] placed *Thrasyderes* in synonymy under *Aplatacris,* a course which has been followed by nearly all authors who have had occasion to mention these little-known but striking insects.

The first modern author to examine material of these genera was Campos, who in 1923 reported *Thrasyderes leprosus* from two localities in lowland western Ecuador, and also described a specimen from Taura in that area as a new variety *pterochlora.*[4] In 1927 the same author described a distinct species, which he called *Aplatacris arborineurus,*[5] from Andean localities in southern Ecuador. The latter species and *leprosus* as understood by him, were shown by Campos to have definite but not markedly pronounced macropterous and brachypterous tendencies.

The acquisition by the Academy of several specimens referable to these units made apparent that two distinct genera were involved, and when opportunity offered both specimens were taken to Cambridge, Massachusetts, and compared with Scudder's original material of *Aplatacris colorata*, now in the Museum of Comparative Zoology.

Scudder based *colorata,* and hence the genus *Aplatacris,* on a single male from the " eastern slope of the Peruvian Andes," and two females from the " Peruvian Marañon," all taken by James Orton. In his preface Scudder explained that the former term was used for material taken "on the road up the Andes, between Yurimaguas on the Huallaga . . . to Chachapoyas, via Balsa Puerto and Moyobamba." Of the original material of *colorata* the male and one female were found in the Cambridge collection, both labelled as "Scudder's type 1875," and with their localities as given in the original description. I do not know the present whereabouts of the second female, but its characters were in all probability fully in agreement with the other of that sex, which is here considered the lectotype of *colorata*.

---

[1] Proc. Boston Soc. Nat. Hist., XVII, p. 271.

[2] Añales Soc. Españ. Hist. Nat., X, p. 481.

[3] Bull. Soc. Entom. Suisse, VII, p. 365.

[4] Revista Colegio Nac. Vicente Rocafuerte. Guayaquil, V, nos. 11-12. p. 23.

[5] Revista Colegio Nac. Vicente Rocafuerte, Guayaquil. IX, nos. 27-28, p. 182, plate.

Study of the material now available, including the Scudder type series, as well as of the literature, makes fully evident that *Thrasyderes* is valid and distinct from *Aplatacris*, that the two genera occupy distinct and complementary areas, and that three species of *Aplatacris* can now be recognized.

As far as present information goes *Thrasyderes* is limited in its distribution to lowland Pacific coastal areas in northern Chile and in Ecuador, and possibly Peru as well, although the sole definite information we have on the latter point is the citation by Pictet and Saussure of Peru without comment as the habitat of *leprosus*. On the other hand *Aplatacris* is clearly Andean in Ecuador and Peru, although the highest elevation from which it is at present definitely known is 7000-8000 feet (Condormarca, Peru).

Individuals of both *Aplatacris* and *Thrasyderes* are exceedingly rare in collections, and probably not at all frequent in nature, unlike the related *Tropidacris* which is sometimes locally numerous. Campos, who has had more intimate acquaintance with these genera in life than any other living entomologist, in 1923 regarded *T. leprosus* as "not common,"[6] although he stated later, in 1927,[7] that he had sent numerous Ecuadorian examples of that species to Dr. Ignacio Bolívar. Several specimens were sent to Philadelphia and are discussed on a subsequent page.

The genera *Aplatacris* and *Thrasyderes* can be separated by the following characters:

Prozona of pronotal dorsum with its three divisions individually sharply keeled medio-longitudinally, the keel in each case arcuato-cristate in profile and definitely compressed with its sides in no way bullate or inflated; surface of whole pronotum covered with pronounced asperous tubercles. Intramarginal cephalic sulcus on the pronotum shallowly or obsoletely impressed. Caudal tibiae with spines of internal margin longer, most of them definitely surpassing in length those of external margin.
Aplatacris Scudder

---

[6] Revista Colegio Nac. Vicente Rocafuerte, Guayaquil, V, nos. 11-12, p 23.

[7] Revista Colegio Nac. Vicente Rocafuerte, Guayaquil, IX, nos. 27-28, p. 181.

Prozona of pronotal dorsum with its three divisions individually arcuato-cristate in profile yet but obsoletely or subobsoletely keeled mediolongitudinally, each section sub-bulbously inflated laterad; surface of pronotum, except the glabrous bullate sections of the prozonal dorsum, almost or quite entirely strumosely lineato-rugose, particularly marked on the metazona. Intra-marginal cephalic sulcus on the pronotum deeply impressed. Caudal tibiae with spines of internal margin shorter, as a whole not surpassing in length those of external margin.... *Thrasyderes* I. Bolívar

The differences in the general structure of the pronotum used in the above key have already been emphasized by Campos in contrasting his *arborineurus* with *leprosus*.

As far as known at present *Thrasyderes* contains but the single species *leprosus* of I. Bolívar, although the lack of topotypic Chilean material prohibits an appraisal of the correct value of Campos' variety *pterochlora*, which conceivably may be a distinct, more northern species. In the case of *Aplatacris* three species are now clearly known, the genotypic *colorata* the most divergent, Campos' *arborineurus* nearest to *Thrasyderes* and *robertsi*, here described, occupying a position between the two previously known.

APLATACRIS Scudder

1875. *Aplatacris* Scudder, Proc. Boston Soc. Nat. Hist., XVII, p. 271

Genotype (by monotypy).—*A. colorata* Scudder.

While *Aplatacris* and *Thrasyderes* are more nearly related to one another than either is to other genera, *Aplatacris* more nearly suggests *Tropidacris* than any other of the related genera. The tegminal and alar type and structure in the two genera here discussed are quite sufficiently dislowing features, which are drawn solely from the female sex, as at present

The three species I refer to *Aplatacris* can be distinguished by the following features, which are drawn solely from the female sex, as at present the male is known for but one of the species.

1. General size larger (♀; length of body, 80:5[8] mm.; length of pronotum, 28.5). Pronotum of ♀ with metazonal portion of median carina much more strongly elevated and definitely arcuate in profile, disk of metazona sharply tectate in transverse section; prozonal portion of median carina very strongly arcuate elevated in profile, the median (second) of the three sections into which the prozona is divided, definitely shorter than the third section; caudal margin of pronotal disk in ♀ definitely rectangulate. Limbs as a whole more slender. (Male with caudal margin of pronotal disk strongly acute-angulate.) .... *colorata* Scudder

---

[8] Taken from Scudder's type, as here selected.

General size smaller (♀; length of body, 64-70 mm.; length of pronotum, 20-22). Pronotum of ♀ with metazonal portion of median carina not strongly elevated and weakly (*robertsi*), if at all (*arborineurus*), arcuate in profile, disk of metazona at most only very weakly tectate in transverse section; prozonal portion of median carina decidedly but less strongly arcuato-elevate in profile, the median (second) of the three sections into which the prozona is divided subequal in length to the third; caudal margin of pronotal disk in ♀ obtuse-angulate. Limbs as a whole more robust, less attenuate, in proportion to other parts. (Male sex not known.) ... 2

2 Size smaller (♀; length of body, 64 mm.; length of pronotum, 20; length of caudal femur, 32). Limbs proportionately less elongate, the caudal femora little more than 1½ times as long as pronotum. Prozonal crest with its first (cephalic) section but slightly longer than the second or the third sections. Wings without any yellow coloration, their two colors being pale dull purplish blue and fuscous-black, the disk of the radiate field with a strong, and the remainder of that field a weak, scalariform vermiculate pattern of the two shades............................*robertsi* new species

Size larger (♀; length of body, 70 mm; length of pronotum, 22; length of caudal femur, 42). Limbs proportionately more elongate, the caudal femora over 1¾ times as long as pronotum.[9] Prozonal crest with its first (cephalic) section 1½ times as long as either the second or the third sections. Wings with costal portion in part clear yellow, multimaculate with obscure brown, which latter solidly colors the radiate field....*arborineurus* Campos

Distribution.—The genus *Aplatacris* is clearly Andean, and apparently extends across the breadth of that uplift in Ecuador and Peru. The known elevations at which it has been taken range from as low as 4757 feet (1450 meters), in the Valley of Catamayo, Ecuador (*arborineurus*), to as high as 7000-8000 feet at Condormarca, Peru (*robertsi*). As a whole this indicates zonally a subtropical distribution.

Aplatacris colorata Scudder

1875. *Aplatacris colorata* Scudder, Proc. Boston Soc. Nat. Hist, XVII, p. 271. [♂: "Eastern slope of the Peruvian Andes": ♀; "Peruvian Marañon."]

As explained in the preface of this paper *colorata* was founded on a single male and two females, of which the male and one of the females remain in the Scudder Collection, now at the Museum of Comparative Zoology, Cambridge, Massachusetts. This female is here selected as the lectotype (M. C. Z. no. 15801), and the male as the allotype. As already remarked the present whereabouts of the second female (paratype) are unknown to me. From the evidence of Scudder's original comments[10] the lectotype here selected "came from the banks of the Amazons, and . . . the Peruvian part of it called the Marañon." As I have already shown, the allotype was taken somewhere on the Andean ridges between Yurimaguas and Chachapoyas, Peru, in other words, at some point between the Huallaga and Marañon valleys, the road now shown, as when Orton did his collecting, passing through Balsa Puerto and Moyabamba. The type locality, i.e , that of the lectotype, is thus some point on or near the Marañon between approximately 6° and 8° S. How broadly *colorata* is distributed over the Peruvian Andes remains to be determined.

---

[9] Campos' measurements and the proportions of his figure are slightly at variance, and the proportions of the photograph have been used here instead of the measurements, which latter would give a ratio of almost twice the pronotal length for that of the caudal femur.

[10] Proc. Boston Soc. Nat. Hist., XVII, p. 257, (1875).

Both of the original specimens of *colorata* now in the Museum of Comparative Zoology have lost most of their original coloration through early immersion in a wet preservative. The sole colorational features still evident are in the wings, which in the expanded male allotype have the costal margin, apex and much of the radiate field blackish blue, most of the areolets outside of the blue, and to an extent also within the blue area, fuscous, the cross nervures pencilled with fine whitish lines.

The measurements (in millimeters) of the type and allotype of *colorata* are as follows:

	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest width of tegmen (at distal third)	Length of wing	Length of caudal femur
♂, *allotype* ..	56.3	18.5	10.4	34.5	11	30	31
♀, *type*	80.5	28.5	14.3	41.7	13	38.5	40

I know of no record of true *colorata* since the original description.

Aplatacris robertsi[11] new species Figures 1 and 3

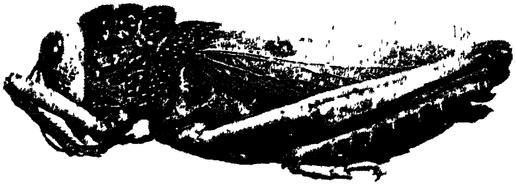
In addition to the characters given as diagnostic in the preceding key to the species of the genus, *robertsi* differs from *A. colorata* in the tegmina being somewhat broader proportionately. It is not possible to compare a number of well preserved general colorational features seen in *robertsi* with *colorata*, as the coloration of the type material of the latter has very largely been destroyed. The differences between these two species, however, are very obvious as soon as material is compared.

Type.— ♀ ; Condormarca, Department of Libertad, Peru.[12] Elevation, 7000-8000 feet. July 8, 1932. (Peruvian Expedition of 1932; H. R. Roberts.) [Academy of Natural Sciences of Philadelphia, Type no. 5691.]

---

[11] In honor of my colleague Dr. H. Radclyffe Roberts, now of the Sanitary Corps, Army of the United States, who collected the type, and who has made important contributions toward our knowledge of the Orthoptera

[12] This locality is on the eastern side of the upper Marañon valley, in an air-line about 21 miles south by east of Cajamarquilla.



1

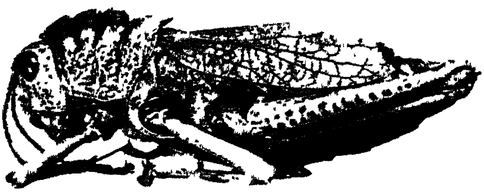
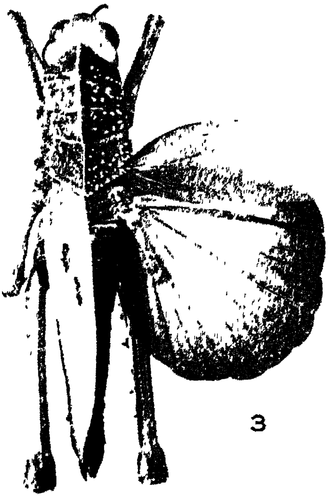


Fig. 1.—*Aplatacris robertsi* new species Lateral view of female (type). Condormarca, Libertad, Peru. (Natural size.)

Fig. 2.—*Thrasyderes leprosus* I. Bolivar Lateral view of female. Durán, Guayas, Ecuador. (Natural size.)

Size medium; form moderately compressed; surface as typical for the genus; i.e., face and lower genae strumosely and irregularly erose foveolate, occiput and upper genae smooth, pronotum and, less strongly, pleura with numerous well elevated asperous tubercles.

Head with greatest breadth across genae distinctly greater than that across eyes, and contained 1½ times in depth of head; occiput quite strongly rounded both longitudinally and transversely, passing smoothly and without any delimitation into the declivent surface of the fastigial disk; interspace between eyes at vertex very broad, but little less than equal to the depth of the eye; fastigium strongly declivent, its surface but faintly impressed within the lateral borders, which are subcarinate cephalad, and as seen from the dorsum briefly subparallel caudad, then subarcuately convergent to the fastigio-facial juncture, where they are but narrowly separated, and without becoming attingent they pass into the lateral borders of the frontal costa, the fastigial surface thus very narrowly continuous with that of the frontal costa; facial line in profile very faintly retreating ventrad of the rounded fastigio-facial juncture; frontal costa marked throughout, narrow, subequal in width except very briefly dorsad at juncture where



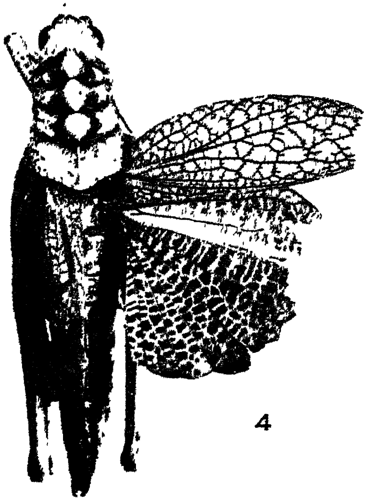


Fig. 3 —*Aplatacris robertsi* new species. Dorsal view of female (type). Condormarca, Libertad, Peru. (Natural size.)

Fig. 4 *Thrasyderes leprosus* I. Bolívar. Dorsal view of female.. Durán, Guayas, Ecuador. (Natural size.)

it is appreciably narrowed, lateral borders carinate, coarsely so in all but a brief dorsal section, surface narrowly and distinctly sulcate throughout except for a short area dorsad of antennal bases where this is less evident; supplementary (lateral) facial carinae strongly developed, strongly diverging ventrad, somewhat sinuate; surface of lower face and genae with the impressed foveolae so marked and numerous as to suggest the pitting of smallpox scars, the intra-foveolar walls or ridges being substrumose. Eyes not prominent in either dorsal or cephalic aspects, basal outline ovoid, greatest breadth of same contained about 1⅓ times in its greatest depth, which is subequal to that of the infra-ocular portion of the genae. Antennae not quite complete, in length at least as long as head and pronotum combined.

Pronotum with greatest caudal width of metazonal disk contained 1¾ times in the medio-dorsal pronotal length; cephalic margin of disk moderately produced mesad, obtuse-angulate with converging sections appreciably concave, caudal margin of disk rather broadly obtuse-angulate, the converging sections very weakly concave, both margins with numerous, rather regularly placed, tubercles, more decided and evident on caudal margin; median carina well developed, on the metazona well elevated and in profile lightly arcuate; prozona trilobate, definitely elevated dorsad of the metazonal level, each lobation arcuate to subarcuate in outline, the incisions which sever the cristato-lobate prozona into three units quite deeply cut, and continued laterad as impressions representing the usual transverse sulci, in length the first (cephalic) section of the prozona is slightly longer than the second or third, which are subequal in length; lateral lobes with their dorsal length, as taken at the usual position of lateral angles of disk, slightly greater than depth of whole pronotum at highest point of prozona, cephalic margin of lobes somewhat sigmoid, caudal one strongly oblique, ventro-cephalic angle obtuse, ventro-caudal angle broadly rounded subobtuse, ventral margin obliquely emarginate cephalad; surface asperities of pronotum well distributed, but more numerous and denser in placing on metazona than elsewhere.

Tegmina falling very slightly short of the apex of the abdomen, elongate elliptical in outline, greatest breadth equal to ⅓ of length; costal margin strongly arcuate proximad and distad, nearly straight mesad, sutural margin as a whole straighter than costal, more briefly arcuate proximad and distad, apex rather broadly rounded; venation well emphasized and appreciably elevated, its pattern well shown in the accompanying figure. Wings orbicular, length and greatest breadth subequal, peripheral margin full, the individual intervals very shallowly scalloped.[13]

Prosternal tubercle strongly developed, spiniform, erect, acute, slightly recurved, subcompressed. Interspace between mesosternal lobes transverse, relatively shallow in depth, subequal in breadth to one of the lobes. Interspace between metasternal lobes very strongly transverse, nearly twice as broad as that between the mesosternal lobes, equal to 1⅔ times the breadth of one of the metasternal lobes, exceedingly shallow.

Supra-anal plate acute trigonal, rather strongly compressed, with the lateral portions markedly deflexed, apex acute; ovipositor valves stout but appreciably compressed, apices of both pairs of valves distinctly falcate, subexcavate dorsal surface of dorsal valves rugulose; subgenital plate with distal margin concave-emarginate ventrad of each ventral valve, median point of margin subacutely produced, lateral portions of margin broadly arcuate.

Cephalic and median limbs of medium length, the femora but moderately thickened and in length subequal to that of the prozonal portion of the pronotum. Caudal femora very faintly surpassing the apices of the ovipositor valves, for the group rather robust, their greatest depth contained but slightly more than five times in their length; caudal tibiae with 9 external (including apical) and 11-12 internal spines, the internal ones appreciably longer and more arcuate than the external ones; caudal tarsi short and stout, in length not exceeding ⅔ that of caudal tibiae.

Coloration.—General base color of head, ventral surface and limbs deep colonial buff (of Ridgway), in some areas darkening to chamois or honey yellow, and in others tending toward isabella color or ecru-olive; base color of pronotum and pleura deep brownish olive. Head with occiput weakly, and labrum, ventral half of clypeus and mandibles more solidly washed with ochraceous-salmon, depths of foveolar impressions of face and genae olive; eyes tawny-olive micropunctulate peripherally with fuscous; antennae yellowish olive to light yellowish olive. Pronotum with the keel line of the median carina and the numerous surface tubercles contrastingly honey yellow to chamois. Tegmina with base color cinnamon to sayal brown (of Ridgway), the venation contrastingly pencilled in lime green to olive-ocher. Wings with disk dark lavender (of Ridgway), the costal, apical and entire peripheral borders broadly and deeply suffused with brownish fuscous, this invading the paler disk by the infuscation of portions of the majority of the areolets, the resulting purplish blue scalariform pattern also carried into the otherwise solid dark border by the discal color finely tinting the greater number of the cross-veins and their numerous ramifications, thus giving a definite " ghost pattern " superimposed on the dark base (see figure 3). Apex of abdomen at least in part washed with carmine to nopal red. Cephalic and median limbs with numerous subcircular spots of lime green; caudal femora with paginal area rather indefinitely and biseriately maculate with lime green, area of the genicular arches and lobes washed with vandyke red; caudal tibiae with the spines and spurs nopal red, narrowly tipped with black.

---

[13] It is evident from an examination of this specimen and those of *Thrasyderes leprosus* here reported, that series of minute asperities along the dorsal surface of the principal veins of the wings, and similar ones on the ventral surface of those of the tegmina, are the specific tools for producing the stridulations made by this genus and *Thrasyderes*, as reported by Campos

Measurements: length of body, 64 mm.; length of pronotum, 20; length of tegmen, 36.5; greatest breadth of tegmen, 12.2; length of wing, 30; greatest breadth of wing, 30; length of caudal femur, 32.

The type of this very striking species is unique.

Aplatacris arborineurus Campos

1927. *Aplatacris arborineurus* Campos, Revista Colegio Nac. Vicente Rocafuerte, Guayaquil, IX, nos. 27-28, p. 182, plate, figs A-C. [♀; Valley of Catamayo (1450 meters elevation) and vicinity of Vilcabamba (1750 meters elevation), [Loja Province,] Ecuador.]

Campos based this species on two females, which he considered as representing macropterous and brachypterous phases of the same species. Such structural features as are given in the original description are almost entirely comparative with *leprosus,* then considered by Campos as congeneric with *arborineurus*, but which, as here shown, belongs to the genus *Thrasyderes*. In consequence Campos' discussion is of little aid in ascertaining the relationship of his species to Scudder's *colorata*, or the here described *robertsi*. The greater part of the description of *arborineurus* is taken up with color features, the value of most of which as specific features can be determined only when more extensive series of the species of *Aplatacris* have been accumulated, and the extent of individual color variation in them determined. Campos' figures have been definitely more helpful in securing an understanding of his species than the description.

In numerous respects *arborineurus* shows divergence from *colorata* toward *Thrasyderes*, and in the linear sequence of *Aplatacris* species I would place it at the end of the latter genus nearest to *Thrasyderes*.

The measurements of *arborineurus* given by Campos are as follows:

Length of body, 70 mm.; length of pronotum, 22; length of caudal femur, 42; length of tegmen, 35 (brachypterous phase)-45 (macropterous phase); width of tegmen, 13 (brachypterous phase)-15 (macropterous phase).

It was emphasized in the original description that the general outline of the wing varies in direct ratio to the length of the tegmen in the macropterous and brachypterous phases.

Campos records that this species possesses definite stridulatory ability, making a "strong grating" sound. Experimentally he was able to produce essentially the same sound by rubbing the under surface of the tegmen against the upper one of the wing.

Whether *arborineurus* is limited to the valleys of the western slope of the Andes in Ecuador, or occurs more widely to the eastward or to the southward in Peru, remains to be determined.

THRASYDERES I. Bolívar

1881. *Thrasyderes* I. Bolívar, Anales Soc. Españ. Hist. Nat., X, p. 481

Genotype (by monotypy.)—*T. leprosus* I. Bolívar.

The general aspect of the pronotum of *Thrasyderes* more nearly suggests *Eutropidacris* than any of the other members of the Tropidacres, although, as already remarked, the nearest relationship is with *Aplatacris*, from which the major differences have been set forth in the preceding key.

Campos has pointed out that Ecuadorian material of *Thrasyderes* varies individually in tegminal and alar length, so much so that these tendencies can be referred to, relatively, as brachypterous and macropterous.[14] The difference in these types, however, is much less pronounced than is usually the case in species of acridid genera showing this character of dimorphism. Whether these differences are also found in Chilean material of *T. leprosus* remains to be determined.

---

[14] Revista Colegio Nac. Vicente Rocafuerte, V, nos. 11-12, p. 23 (1923); Idem, IX, nos. 27-28, p. 183 footnote, (1927).

Thrasyderes leprosus I. Bolívar Figures 2 and 4

1881. *Thrasyderes leprosus* I. Bolívar, Anales Soc. Españ. Hist. Nat., X, p. 482, pl. IX, fig. 2. [♀; Huasco, Chile]

1884. *Thrasyderes leprosus* I. Bolívar, Artropodos del Viaje al Pacífico, Insectos Neurópteros y Ortópteros, p. 40, pl I, fig 5. [Largely reprint of 1881 matter]

1923. *Th[rasyderes] leprosus* var. *pterochlora* Campos, Rivista Colegio Nac. Vicente Rocafuerte, Guayaquil, V, nos. 11-12, p. 23. [♀; Taura, [Guayas Province,] Ecuador.]

1927. *A[platacris] leprosus* Campos, Revista Colegio Nac. Vicente Rocafuerte, Guayaquil, IX, nos. 27-28, p. 181, plate, figs. A-C.

ECUADOR: Durán [,Province of Guayas]; (F. Campos); 1 ♂; [Hebard Cln.]; 1 ♀; [A.N.S.P.]; II, 12, 1911; (S. N. Rhoads); 1 juv.; [A.N.S.P.].

To determine whether the identification of Ecuadorian material as *leprosus* is correct, or whether Campos' *pterochlora* was applied to a species of *Thrasyderes* distinct from the Chilean *leprosus*, will require direct comparison of Chilean and Ecuadorian material, which is not possible at this time. The name *pterochlora* was given to what was considered to be a color variety of *leprosus*, which latter was also regarded by Campos as occurring in the coastal region of Ecuador. From what we know of color variation in related tropidacridine genera, such as *Tropidacris* and *Eutropidacris*, plasticity in this respect may be expected. In their extreme conditions such color forms may appear quite different, but are quite unworthy of recognition by name, regardless of whether they have a genetic or physiologic background.

There is, however, some suggestion of differences in structure and basic color pattern, rather than tone, when the above-listed Ecuador individuals are compared with Bolívar's description of *leprosus*. The female Durán specimen now before me is definitely larger in all respects than the dimensions given for the female type of *leprosus*, as shown below. The pronotum of *leprosus*, as figured by Bolívar, has the rugosities of the metazona limited to the caudal half of that area, while in the Durán adults now before me virtually the whole of both the dorsal and lateral aspects of the metazona are strumosely verrucose. The wings of *leprosus* are said to be "fusconigris, antice dilutioribus et prope venas hyalinis," while in the Durán pair before me the veins of the whole wing are in greater part outlined with subopaque whitish, while most of the radiate field of the wings is solidly washed, over pale veins as well, with pale blue. The caudal femora of *leprosus* are said to be "extus maculis albicantibus," while the Durán female the reddish brown base color is marked with greenish or olivaceous, and in the male the prussian green to sea green base color is overlaid with buckthorn brown. Only the acquisition of more material will show whether these features are of more than individual value. If the Ecuador insect should prove to be distinct from the Chilean *leprosus,* Campos' *pterochlora* would be available as its specific name.

The dimensions (in millimeters) of Bolívar's type and the Durán adults now before me are as follows:

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur
♂, Durán, Ecuador.................	56.5	18.5	31.5	21 5
♀, Huasco, Chile (*type*), ex Bolivar.	65	17	32	29
♀, Durán, Ecuador.................	69	19.5	36 [15]	34

Campos gave Durán and Taura, Ecuador, as the localities at which he had taken *leprosus,* where it occurred on hills or stony ground. According to him it is sometimes given the name " Carricoche " (i.e., cart), in allusion to its marked stridulation, made with its alar organs, and which resembles the sound made by a toy of the same name, very probably suggested by the screeching often heard from the ungreased solid wheels of carts in Latin America. While in 1923 Campos considered the species as "not common," by 1927 he reported having sent a number of specimens to Dr. Ignacio Bolívar. It is quite possible the species may be locally numerous, but by no means generally distributed.

The sole localities from which the species has been reported are Huasco, Chile, and Durán and Taura, Province of Guayas, Ecuador. It is thus quite definitely a species of relatively low levels, and may be found at suitable points along the coastal section of Peru.

---

[15] Estimated, tips of both tegmina damaged.

NOTULAE NATURAE

NUMBER 132 OF MAY 12, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

WELL-BORING AT BRANDYWINE LIGHTHOUSE IN DELAWARE BAY

PART I.—GEOLOGY AND MACROFOSSILS

by HORACE G. RICHARDS AND ANNE HARBISON

Department of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia

The present report is concerned with the macrofossils obtained from cuttings from an 825 foot water well recently drilled at Brandywine Lighthouse in Delaware Bay. The lighthouse is built on a shoal approximately midway between Cape May, New Jersey, and Cape Henlopen, Delaware, a few hundred yards on the New Jersey side of the state line.

Careful samples were saved by Mr. T. Clifton McGee, of the Artesian Well Drilling Company of Philadelphia. These were given to Mr. Meredith E. Johnson, State Geologist of New Jersey, who in turn, submitted them to the writers for a detailed paleontological report. The study was jointly sponsored by the Academy of Natural Sciences of Philadelphia and the New Jersey Geological Survey.

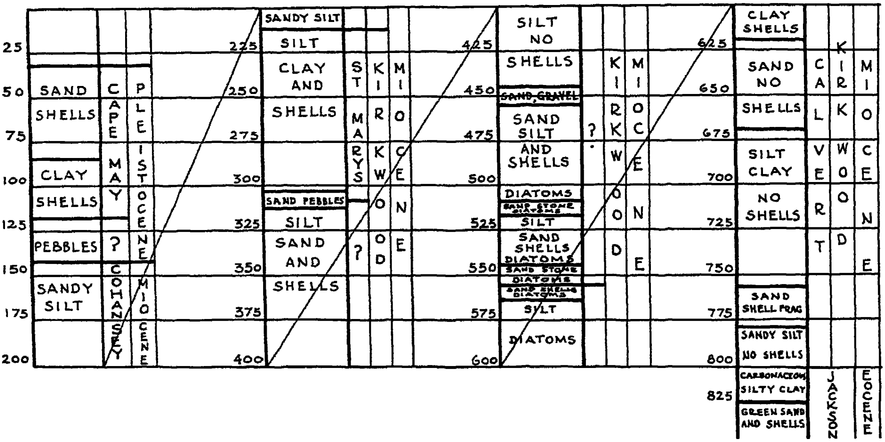
We are indebted to Mr. McGee for his care in obtaining these samples, and to Mr. Johnson for turning them over to us for study. Dr. R. S. Bassler, of the United States National Museum, examined the bryozoa from the Eocene section of the well, and Dr. Joseph A. Cushman, of Sharon, Massachusetts, determined the foraminifera from the same horizon. Dr. H. A. Pilsbry examined some of the barnacle fragments and reviewed the new species of mollusks. The diatoms have been studied by Dr. Ruth Patrick in a separate part of this report.[1] To all these we wish to express our sincere thanks.

---

[1] See Notulae Naturae, no. 131 (1944).

In all, 62 samples were received. Of these, 35 contained fossils, although many were merely indeterminable fragments. Sets of fossils have been added to the collections of the Academy of Natural Sciences of Philadelphia and of the New Jersey State Museum.

The log of the well is here shown graphically.



PLEISTOCENE (CAPE MAY FORMATION)

Depth 45-82 feet

Ensis directus Conrad
Tellina tenera Say
Crepidula plana Say

Depth 82-90 feet

Fragments

Depth 102-116 feet

Arca transversa Say (fragment)

Although the list of fossils is very small, it is believed that the section between 34 and 128 feet can be assigned without question to the Cape May formation of late Pleistocene age.

Other wells in the vicinity show approximately the same thickness for the Cape May formation: [2]

---

[2] In part from Richards and Harbison, Proc. Acad. Nat. Sci. Phila., vol. 94, p. 234, fig. 5, 1942.

Atlantic City, N. J.	90	Rio Grande, N. J.	193
Avalon, N. J.	100	Cape May, N. J.	90
Wildwood, N. J.	132	Lewes, Del.	125

It was recently pointed out[3] that the Cape May formation thickens in the vicinity of Delaware Bay and probably represents deposits in a deeper portion of a pre-Cape May valley within the present estuary. The unusual thickness at Rio Grande, New Jersey, was found in a well drilled during the latter part of 1942.

PLEISTOCENE (? FORMATION)

The pebbly sand between 130 and 140 feet probably represents an early Pleistocene deposit, pre-Cape May in age, possibly equivalent to the Pensauken formation. Pebbles occur up to 1½ inches in diameter.

MIOCENE (COHANSEY FORMATION)

The section between 140 and 220 feet largely consists of fine sand with no fossils and can probably be referred to the Cohansey formation of late Miocene age.

MIOCENE (KIRKWOOD FORMATION)

220-230 feet

Venus mercenaria L.
Astarte perplana Conrad
Ostrea frag.
Pecten frag.

230-240 feet

Mya producta Conrad
Venus mercenaria L. (?)
Turritella cumberlandia Conrad
Myliobatis sp. (Ray tooth)

240-250 feet

Venus mercenaria L. (?)

250-260 feet

Mya producta Conrad
Polinices heros Say

260-276 feet

Astarte undulata cf. var. *vaginulata* Dall
Venus mercenaria L. (frag.)
Pecten madisonius Say

---

[3] MacClintock, Paul and H. G. Richards, Bull. Geol. Soc. Amer, vol. 47, pp. 311-12, 1936.

276-287 feet

Pecten madisonius Say
Yoldia laevis (Say)
Phacoides crenulatus (Conrad)
Ensis directus Conrad
Corbula inaequalis Say
Phacoides anodonta (Say) (?)
Mya producta Conrad
Venus sp. (juv.)
Cadulus conradi Pils. & Harb.

287-298 feet

Melina maxillata (Deshayes)
Corbula inaequalis Say

298 feet

Pecten madisonius Say (frag.)
Astarte distans Conrad
Astarte perplana Conrad
Corbula inaequalis Say

308 feet

Pecten madisonius Say
Astarte perplana Conrad
A. undulata Conrad
A. undulata cf. var. *vaginulata* Dall
Venus mercenaria L.
Melina maxillata (Deshayes)
Crassinella profundorum Pils. & Harb.
Corbula idonea Conrad
C. inaequalis Say
Tellina declivis Conrad
Dosinia acetabulum (Conrad)
Cardium patuxentium Glenn (?)
Balanus sp.

316 feet

Pecten madisonius Say
Venus mercenaria L.
Astarte perplana Conrad
A. undulata cf. var. *vaginulata* Dall
Corbula idonea Conrad
Turritella cumberlandia Conrad
Balanus sp.

328 feet

Phacoides crenulatus (Conrad)
Terebra sp. (juv.)

340 feet

Polinices sp. (frag.)

350 feet

Shark tooth

372 feet

Pecten madisonius Say
Venus mercenaria L.
Astarte undulata cf. var. *vaginulata* Dall
Arca subrostrata Conrad
A. improcera Conrad (?) frag.
Arca idonea Conrad (?) frag.
Cytherea sp.
Turritella cumberlandia Conrad
T. aequistriata Conrad
Polinices sp. frag.
Balanus sp.

385 feet

Pecten madisonius Say
Astarte distans Conrad
A. undulata cf. var. *vaginulata* Dall
Corbula inaequalis Say
Mulinia lateralis (Say)
Arca subrostrata Conrad
Venus plena (Conrad) (juv.)
Calyptraea aperta (Solander)
Turritella cumberlandia Conrad
Seila clavulus (Lea)
Crepidula fornicata (L.)
Polinices duplicata (Say)
Mitrella communis (Conrad)
Acteocina kirkwoodiana n. sp.
Nassarius trivittatoides (Whit.)
Crucibulum costatum (Say)
Cadulus conradi Pils. & Harb.

400 feet

Pecten madisonius Say
Mya producta Conrad
Arca transversa Say
A. subrostrata Conrad
Cardium laqueatum Conrad
Phacoides crenulatus (Conrad)
Cardita arata (Conrad)
Crepidula fornicata (L.)
Crucibulum costatum (Say)
Turritella cumberlandia Conrad
Polinices duplicata (Say)
P. heros (Say)
Scalaria marylandica (Martin)
Eulima eborea Conrad
Cadulus conradi Pils. & Harb.

443-448 feet

Pecten madisonius Say
Ostrea sp. frag.
Balanus sp.

480-485 feet

Pecten madisonius Say
Arca subrostrata Conrad
Nucula proxima Say
Astarte distans Conrad
A. undulata vaginulata Dall
Cardium patuxentium Glenn
Glycymeris parilis (Conrad)
Chione latilirata (Conrad)
Turritella cumberlandia Conrad
Balanus sp.

485-497 feet

Cardium laqueatum Conrad
C. patuxentium Glenn (juv.)
Arca staminea Conrad
Turritella cumberlandia Conrad
Balanus sp.

499-505 feet

Crassinella profundorum Pils. & Harb.
Mulinia lateralis (Say)
Semele sp. (frag.)
Terebra dislocata Say (?)
Turritella cumberlandia Conrad
Balanus sp.

505-517 feet

Unidentifiable shell fragments

525-546 feet

Macrocallista marylandica (Conrad)

548-555 feet (similar to "Cohansey Quartzite" at Fairton, New Jersey)

Arca improcera Conrad (?)
Eucrassatella melina (Conrad)
Pecten sp.
Cardium sp.
Bulliopsis integra (Conrad) (?)

558-562 feet

Pecten eboreus Conrad (frag.)
Terebra dislocata (Say) (?)

596-613 feet

Pecten madisonius Say
P. eboreus Conrad
Arca subrostrata Conrad
Mulinia lateralis Say

613-631 feet

Dosinia acetabulum (Conrad)
Eucrassatella melina (Conrad)
Venericardia granulata Say
Venus mercenaria L.
Corbula inaequalis Say
Mulinia lateralis (Say)
Pecten madisonius Say
P. eboreus Conrad
Melina maxillata (Deshayes)
Corbula idonea Conrad
Arca subrostrata Conrad
Glycymeris parilis (Conrad)
Arca transversa Say
Turritella cumberlandia Conrad
T. aequistriata Conrad
Terebra dislocata (Say)
Calyptraea aperta (Solander)

765-782 feet

Astarte distans Conrad	*Venus* sp.
	Shark tooth

782-794 feet

Unidentifiable shell fragments

List of Miocene Fossils from Well at Brandywine Lighthouse

PELECYPODA

Nucula proxima Say 480-85
Yoldia laevis (Say) 276-87
Arca idonea Conrad (?) 372
Arca improcera Conrad (?) 372, 548-55
Arca staminea Say 485-97

These fragments were very similar to fragments figured by Whitfield from the well at Atlantic City, New Jersey, and identified as *Arca callipleura* Conrad (=*A. staminea* Conrad).

Arca subrostrata Conrad 372, 385, 400, 480-85, 596-613, 613-31
Arca transversa Say 400, 613-631

First record for this species earlier than the Pliocene. It is, of course, possible that the specimens actually came from a higher level in the well.

Glycymeris parilis (Conrad) 480-85, 613-31
Melina maxillata (Deshayes) 287-98, 308. 613-31
Pecten madisonius Say 260-76, 276-87, 298, 308, 316, 372, 385, 400, 443-48, 480-85, 596-613, 613-31
Pecten eboreus Conrad 558-562, 596-613, 613-31

First record of this species north of Virginia. Fragments only, and therefore, impossible to determine as to any varietal identification.

Ostrea sp. 220-30, 443-48
Astarte distans Conrad 298, 385, 480-85, 613-31
Astarte perplana Conrad 220-30, 298, 308, 316
Astarte undulata Conrad 308
Astarte undulata variety *vaginulata* Dall 260-76, 308, 316, 372, 385, 480-85

Most of the specimens of *A. undulata* from the Brandywine well resemble Dall's variety *vaginulata*. The growth lines are very close together near the back of the shell, but are much wider apart and less distinct in the younger part of the shell. The variety apparently intergrades with the typical *undulata* of Conrad. Variety *vaginulata* is more characteristic of the Virginia Miocene.

Crassinella profundorum Pilsbry & Harbison 499-505
Eucrassatella melina (Conrad) 548-55, 613-31
Cardita arata (Conrad) 400
Venericardia granulata Say 613-31
Phacoïdes anodonta Say (?) 276-87
Phacoïdes crenulatus (Conrad) 276-87, 328, 400
Cardium laqueatum Conrad 400, 485-97
Cardium patuxentium Glenn 308, 480-85, 485-97
Macrocallista marylandica (Conrad) 525-46
Dosinia acetabulum (Conrad) 308, 613-31
Venus mercenaria Linne 220-30, 230-40, 240-50, 260-76, 308, 316, 372, 613-31
Venus plena (Conrad) 385 (juv.)
Cytherea sp. 372
Mulinia lateralis (Say) 385, 499-505, 596-613, 613-31
Corbula idonea Conrad 308, 316, 613-31
Corbula inaequalis Say 276-87, 287-98, 298, 308, 385, 613-31
Chione latilirata (Conrad) 480-85
Semele sp. 499-505
Tellina declivis Conrad 308
Ensis directus (Conrad) 276-87
Mya producta Conrad 230-40, 250-60, 276-87, 400

GASTROPODA

Turritella aequistriata Conrad 372, 613-31
Turritella cumberlandia Conrad 230-40, 316, 372, 385, 400, 480-85, 485-97, 499-505, 613-31
Seila clavulus (Lea) 385
Scalaria marylandica (Martin) 400
Turbonilla interrupta Say 499-505
Calyptraea aperta (Solander) 385, 613-31
Crucibulum costatum (Say) 385, 400
Crepidula fornicata (Linne) 385, 400
Polinices heros (Say) 250-60, 400
Polinices duplicata (Say) 385, 400
Mitrella communis (Conrad) 385
Eulima eborea Conrad 400
Nassarius trivittatoides (Whitfield) 385

Bulliopsis integra (Conrad) 548-55
Terebra dislocata (Say) (?) 558-62, 613-31

Acteocina kirkwoodiana new species Figures 1, 5, 6

Shell of small size, subcylindrical and smooth. Aperture quite narrow in the upper two-thirds, expanding in an oval toward the base. Columellar fold heavy; callus deeply channelled. Spire nearly flat except for the projecting first whorl.

The holotype has a slightly depressed spire, although this latter feature may have been partly caused by damage to the shell.

Dimensions: Holotype (N. J. S. M. 10681): length, 4.6 mm.; width, 2.2 mm. Paratype (A. N. S. P. 15935): length, 5.2 mm.; width, 2.4 mm.

Type locality: Brandywine Lighthouse well, Delaware Bay, New Jersey, depth 385 feet.

Age: Miocene (Kirkwood).

A. kirkwoodiana resembles *A. sphalera* Gardner from the Shoal River Miocene of Florida, but is slightly smaller and has a lower spire.

SCAPHOPODA

Cadulus conradi Pilsbry & Harbison 276-87, 385, 400

CIRRIPEDIA

Balanus sp. 308, 316, 372, 443-48, 480-85, 485-97

VERTEBRATA

Myliobatis sp. 230-40
Shark teeth 350, 613-31

CORRELATION

A recent report by the present writers[4] attempted to analyze the fauna of the Kirkwood formation of New Jersey. It was shown that several phases were represented. The upper part, as shown in wells in the southern part of the State, was equivalent to the St. Mary's formation of Maryland. The lower part, as shown in wells and outcrops at Shiloh, New Jersey, more nearly represented the Calvert formation of Maryland. No separate Choptank phase was recognised, and it was suggested that the Choptank, at least in New Jersey, is a phase of the Calvert.

The upper part of the Miocene section of the Brandywine probably represents the St. Mary's phase. *Astarte perplana* Conrad, a characteristic

---

[4] Proc. Acad. Nat. Sci. Phila., vol. 94, pp. 167-250, 1942.

St. Mary's species, was found between 220 and 316 feet. Furthermore, the presence of such cool water forms as *Mya producta* and *Polinices heros,* largely limited to the upper section of the well, may possibly indicate the presence of the St. Mary's phase. The presence of the characteristic St. Mary's *Bulliopsis integra* (Conrad) in the consolidated layer between 548 and 555 feet suggests that the St. Mary's extends to that depth. A study of the diatoms from this same well in an accompanying report by Dr. Ruth Patrick[5] suggests a decided break between two Miocene deposits at about this same level, again suggesting a Calvert or Choptank-St. Mary's contact.

It is also possible that the break indicated by the diatoms may represent two phases of the Calvert, in as much as several characteristic Calvert-Choptank species extend well above the 555 foot "break".

The fauna as a whole correlates better with the Maryland than it does with the New Jersey faunas. The greater abundance of *Astarte undulata* (cf. var. *vaginulata*) rather than the New Jersey *A. distans* reflects this affinity, as does the presence of the Maryland *Mitrella communis* instead of the variety *mediocris* Pilsbry and Harbison described from New Jersey. This might be expected as far south as Delaware Bay. There is also a somewhat more southern affinity as shown by some of the species in the accompanying table.

The species from the deeper part of the Miocene section most closely correlate with the Calvert. For example *Eucrassatella melina* Conrad, *Cardium patuxentium* Glenn, and *Arca subrostrata* Conrad are not known from the Miocene Chesapeake Group higher than the Calvert.

Of the total of 52 Miocene species recorded from the Brandywine well, all but ten have been found in the Kirkwood of New Jersey. The accompanying table indicates those species not previously recorded from the New Jersey Miocene, together with notes on their distribution. For notes on the distribution of the other species see the previous paper by the authors cited above.

PELECYPODA	Depth	Maryland Miocene	Other Miocene	Geol. Range
Astarte undulata Conrad	308	Calv., Chop.	Va., N. C., S. C.	Miocene
A. undulata vaginulata Dall	260–485	....	Va.	Miocene
Arca improcera Conrad	312, 555	.. . .	Va., N. C., S. C.	Upper Mio.-Plio.

---

[5] Notulae Naturae, no 131, 1944

PELECYPODA	Depth	Maryland Miocene	Other Miocene	Geol Range
Chione latilirata (Conrad)	480–485	Calv., Chop.	Va., N. C.	Mio.-Recent
Arca transversa Say	400, 613 631	....	....	Plio.-Recent
Pecten eboreus Conrad	316, 558 613–31	....	Va., N. C., Fla.	Mio.-Plio.
GASTROPODA				
Mitrella communis (Conrad)	385	Calv., Chop., St. M.	Va.	Miocene
Acteocina kirkwoodiana n. sp.	385	....	... .	Miocene
Eulima eborea Conrad	400	Calv., St M.	....	Miocene
Terebra dislocata (Say)	558–631	....	Va., N. C., Fla.	Mio.-Recent

The presence of *Arca transversa* Say, not hitherto reported earlier than the Pliocene, is noteworthy. The possibility must be considered that these came from higher levels in the well and were mechanically mixed with the Miocene sediments.

It does not seem possible to make further subdivisions of the Kirkwood from this well. The layer of coarse sand and pebbles at 308 feet may represent the break between the Calvert (or Choptank) and the St. Mary's. However, since shell fragments are found both above and below this level, there is no indication of a complete withdrawal of the sea. As in the case of the New Jersey wells studied in the earlier report by the writers, no indications were found of a break, either faunal or stratigraphic. between the Calvert and the Choptank.

The presence of *Venericardia granulata* Say between 613 and 631 feet may have some significance. Although this species is widespread throughout the Miocene and Pliocene from Maryland southward, it is only known in New Jersey from the lowest part of the Miocene section (Atlantic City (936-41); Avalon (810); Wildwood (800-1000); Cape May (1140)). It can thus be used as an index of the lower part of the Calvart phase of the Kirkwood. In the Brandywine well, this *Venericardia* horizon is underlain by 134 feet of non-fossiliferous sand, silt and clay. Below this, between 765 and 784 feet, shell fragments were present, but none were identifiable. The Miocene-Eocene contact is thought to occur at 800 feet, for below that level identifiable Eocene fossils occur. In the Atlantic City well the Miocene-Eocene contact is placed at 1240 feet.

EOCENE (JACKSONIAN)

The greenish sand at the 825 foot depth was found to contain the following mollusks:

Pecten (Chlamys) delawarensis new species Figures 2, 3, 4

Exterior of shell with about 26 strong, smoothly defined radial ribs which are wider than the intervals; towards both ends, the ribs become obsolete. The ears have fine radiating riblets, and are unequal. The shell is very fragile and it is possible that our specimens are not mature.

The paratype (A. N. S. P. 15936) consists of two valves fastened together, the valves being essentially similar. The shell is very flat, there being very little room for the animal between the shells. The holotype (N. J. S. M. 10682) is a single valve and, although slightly larger than the type, is a little worn on the surface. A paratype (A. N. S. P. 15937) is larger and better preserved than the holotype, but unfortunately was badly damaged during preparation. Fortunately, however, a photograph was taken before it was damaged (fig. 2).

Dimensions: Holotype (N. J. S. M. 10682); length, 6.8 mm.; width, 5.4 mm. Paratype (A. N. S. P. 15936); length, 5.2 mm.; width 4.8 mm. Paratype (A. N. S. P. 15937); length, 9.2 mm.; width, 7.8 mm.

Type locality: Brandywine Lighthouse well, depth 825 feet.

Age: Eocene (Jacksonian).

The new species resembles *P. greggi* Harris from the Wilcox (Eocene) of Georgia, but is proportionally wider at the middle and somewhat flatter. Also the ribs of *P. delawarensis* are less elevated. *P. rigbyi* Whitfield from the Shark River (Eocene) of New Jersey is another related species, but has coarser ribs and wider interspaces.

Ostrea compressirostra Say Figures 7, 8

Young shells similar to those reported from the Eocene (Aquia formation) of Maryland. The young of this species are practically indistinguishable from the young of *O. sellaeformis* Conrad which is also known from the Maryland Eocene.

Scalaria virginiana Clark Figure 9

One young individual; this species has been described from the Aquia formation of Maryland.

The molluscan fauna definitely suggests an Eocene age, although it is difficult to determine the exact formation.

Bryozoa from the sample were examined by Dr. R. S. Bassler, who reported as follows: "I have gone over your Bryozoa from Brandywine Light and find that they consist of *Lunularia fenestrata* DeGregorio, a Lower Jackson species, and several species of *Metradolium*, which are quite close to those found in the Jackson. I think, therefore, the horizon is lower to middle Jacksonian but above the Vincentown zone. This is a new occurrence in New Jersey and possibly a formation hitherto not recognized."

A single species of foraminifera was identified by Dr. Joseph Cushman as *Dentalina* cf. *fissicostata* Gümbel, a characteristic Eocene form.

Fragments of barnacles were identified by Dr. H. A. Pilsbry as an undescribed species of *Solidobalanus*. Since no scutae or tergae were obtained, it does not seem wise to describe the species at the present time.

Claws of a crab of the family Xanthidae were also present.

The greensand at the 825 foot depth is definitely of Eocene age, and most probably belongs to a formation equivalent to the Jackson of the Gulf Coast. This is the first time that a Jackson equivalent has been recognized as far north as New Jersey. The Santee limestone and Cooper marl of South Carolina and the Castle Hayne formation of North Carolina have been regarded as of Jackson age, but no correlated deposits have been recognized north of North Carolina.

The Eocene outcrops of New Jersey consist of four formations. The highest is the Shark River marl which occurs locally in Monmouth County (and vicinity) and which has been correlated with the Claiborne group of the Gulf Coast and the Nanjemoy formation of Maryland. The Manasquan marl is slightly older than the Shark River, but is apparently very close to it lithologically and faunally. The Rancocas Group, consisting of the Vincentown and Hornerstown formations, outcrops in a belt extending entirely across the State from Long Branch to Salem and is correlated with the Aquia formation of Maryland and the Wilcox Group of the Gulf Coast.

In only a few wells in southern New Jersey can the Miocene-Eocene contact be determined. In no case is there any fossiliferous deposit between the base of the Miocene Kirkwood and the top of the Eocene Vincentown. Apparently, the Jackson formation is very thin or absent north of Delaware Bay, although it may possibly have an equivalent in some of the greensand at the base of the Kirkwood and on top of the Vincentown, at 1240 feet, in the Atlantic City well.

The possibility must also be considered that the 825 foot greensand in the Brandywine well is equivalent to the Eocene Shark River formation which is older than the Jackson; however, the paleontological evidence, particularly from the Bryozoa, favors a later, probably Jackson, dating. It is hoped that other wells in the Delaware Bay area will penetrate this formation and give additional data on its fauna.

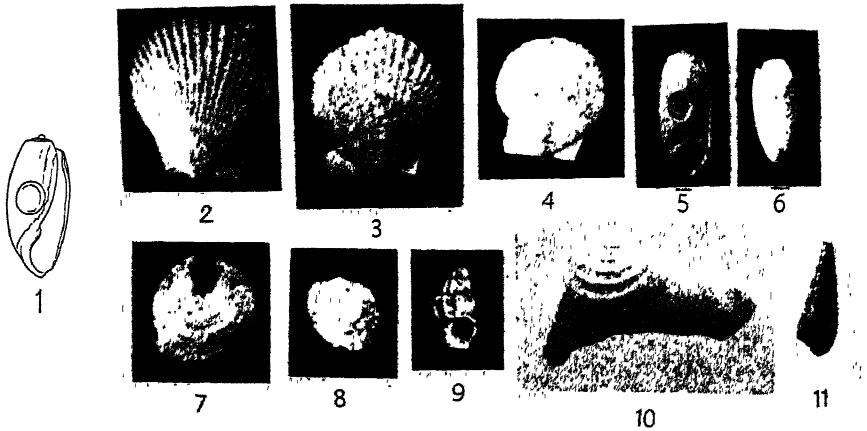


Fig. 1. *Aceteocina kirkwoodiana* new sp. (Paratype) A.N.S.P. 15935. × 3 Fig. 2. *Pecten delawarensis* new sp. A.N.S.P. 15937. × 3½. Fig. 3. *Pecten delawarensis* new sp. (Holotype) N.J S.M. 10682. × about 2½. Fig. 4. *Pecten delawarensis* new sp. (Paratype) × 3. Fig. 5. *Acteocina kirkwoodiana* new sp. (Paratype) A.N.S P. 15935. × 3. Fig. 6. *Acteocina kirkwoodiana* new sp (Holotype) N J S.M. 10681. × 3. Fig. 7. *Ostrea compressirostra* Say N J.S.M. 10685. × 3. Fig. 8. *Ostrea compressirostra* Say. A.N S.P. 15989. × 3. Fig. 9. *Scalaria virginiana* Clark. N.J.S M. 10683. × 3. Fig. 10. *Astarte undulata* cf var. *vaginulata* Dall. N.J S.M. 10730. × about 2. Fig 11. *Eulima eborea* Conrad, N J.S M. 10684. × 3.

NOTULAE NATURAE

NUMBER 133 OF MAY 12, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

WELL-BORING AT BRANDYWINE LIGHTHOUSE IN DELAWARE BAY

PART II.—MIOCENE DIATOMS

by RUTH PATRICK

Associate Curator, Department of Microscopy, The Academy of Natural Sciences of Philadelphia

At the suggestion of Dr. Horace G. Richards a study was made of the diatoms present in the samples from the well-bore at Brandywine Lighthouse, New Jersey.[1] This lighthouse is built on a shoal approximately midway between Cape May, New Jersey and Cape Henlopen, Delaware. The samples from depths of 825-558 ft. were labeled Brandywine Lighthouse, while those from 558-497 ft. were labeled Brandywine Shoals. However, Dr. Richards assures me they are from the same well-bore.

The samples from 825-596 ft. showed no diatom flora. In the sample 631-613 ft. a few sponge spicules were found. In the sample 596-562 ft. a well developed flora was first apparent. This flora continues to 520 ft. In the sample 520-517 ft. the diatoms are badly broken and a true flora, if present, was certainly not well developed. The fragments decrease at successively higher levels and at 497 ft. a very few are present. Of course this fragmentation of the shells might be due to subsequent reworking, but also there is evidence that the shells available for fragmentation had decreased.

In this study no attempt has been made to identify all the species present. By this I mean that only one or two slides have been carefully studied from each level. As the deposit represented is evidently all Miocene, only one specimen is referred to under each species. In the record of distribution the number in parenthesis refers to the slide in the herbarium of the Academy of Natural Sciences of Philadelphia on which the species may be found. Under the heading "Miocene Distribution" is given the distribution of the species in the Miocene deposits of the Atlantic Coast. In every case the original description of the species has been read and the literature reference verified.

---

[1] For a general discussion of this well-boring, its geology and macrofossils, see Part I of this report by Dr. H. G. Richards and Anne Harbison, Notulae Naturae, no. 130, 1944.

I wish to express my thanks to Dr. Thomas S. Stewart, who took the photographs included in the plate.

CENTRALES

DISCINEAE

COSCINODISCACEAE

MELOSIROIDEAE

HYALODISCUS Ehrenberg

Hyalodiscus radiatus (O'Meara) Grunow

Hyalodiscus radiatus (O'Meara) Grunow apud Cleve and Grunow, 1880, K. Sv. Vet. Akad. Handl., vol. 17, no. 2, p. 117.

Pyxidicula radiata O'Meara, 1877, Jour. Linn. Soc., Bot., vol. 15, p. 58

Though this species is not recorded, so far as I know, in the literature from the Miocene beds of our Atlantic Coast, it is present on one of Woolman's slides (A-1170) from an artesian well at Cape May, New Jersey, which is a Miocene formation. It is also present on one of Boyer's slides (L-I-21) from an artesian well at St. Augustine, Florida. Boyer states that this deposit is very similar to the Miocene beds of the Atlantic Coast. Also it is found on Boyer's slide H-I-5, from an artesian well, Atlantic City, New Jersey.

Miocene Distribution: Florida, St. Augustine (probably Miocene); New Jersey, Atlantic City, Brandywine Lighthouse, (A-2268), Cape May.

Melosira sulcata (Ehrenberg) Kutzing

Melosira sulcata (Ehrenberg) Kutzing, 1844, Bacill., p. 55, pl. 2, fig. 7.

Gaillonella sulcata Ehrenberg. 1838, Die Infusionsthierchen als Vollkommene Organismen, p. 170, pl. 21, fig. 5.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2268). This species is common in Miocene of the Atlantic Coast, and it is hard to separate its distribution from that of its varieties.

Melosira sulcata var. **biseriata** Grunow

Melosira sulcata var. *biseriata* Grunow apud Van Heurck, 1882, Syn. Diat. Belgique, pl. 91, fig. 23.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2269), probably throughout the Miocene deposits of the Atlantic Coast, but by some workers not separated from the species.

Melosira sulcata var. **coronata** (Ehrenberg) Grunow

Melosira sulcata var. *coronata* (Ehrenberg) Grunow apud Van Heurck, 1882, Syn. Diat. Belgique, pl. 91, fig. 17.

Gaillonella coronata Ehrenberg, 1845, Berichte K. Akad. Wiss. Berlin, 1845, p. 154.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2269), probably widely distributed throughout the Atlantic Coast deposits but not separated from the species.

Melosira sulcata var. **coronata** f. **minor** Grunow

Melosira sulcata var. *coronata* f *minor* Grunow apud Van Heurck, 1882, Syn. Diat. Belgique, pl. 91, fig. 18.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2278); Virginia, Richmond. Probably more widely distributed than this.

STEPHANOPYXIS Ehrenberg emend Grunow

Stephanopyxis corona (Ehrenberg) Grunow

Stephanopyxis corona (Ehrenberg) Grunow apud Van Heurck, 1882, Syn Diat. Belgique, pl. 83 ter., figs. 10-11.

Systephania corona Ehrenberg 1844, Berichte K. Akad. Wiss. Berlin, 1844, p. 272.

Miocene Distribution: Florida, St. Augustine (probably Miocene); Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2286); North Carolina-Virginia, Dismal Swamp; Virginia, Bermuda Tripoli, Richmond.

COSCINODISCOIDEAE

COSCINODISCUS Ehrenberg emend Rattray

Coscinodiscus apiculatus Ehrenberg

Coscinodiscus apiculatus Ehrenberg, 1844, Berichte K. Akad. Wiss. Berlin, 1844, p. 77.

Miocene Distribution: Maryland; New Jersey, Brandywine Lighthouse (A-2278); North Carolina-Virginia, Dismal Swamp; Virginia, Fortress Monroe, Richmond, Rappahannock Cliffs, Stratford Cliffs, Browns Mills.

Coscinodiscus asteromphalus var. **omphalanthus** (Ehrenberg) Grunow

Coscinodiscus asteromphalus var *omphalantha* (Ehrenberg) Grunow, 1884, Denk. Math.-Naturwiss. Classe, Kaiserlichen Akad. Wiss. Berlin, vol. 48, p. 26.

Coscinodiscus omphalanthus Ehrenberg, 1844, Berichte K. Akad. Wiss. Berlin, 1844, p. 266.

Miocene Distribution: Maryland; New Jersey, Brandywine Lighthouse (A-2286); Virginia, Fortress Monroe, Bermuda Tripoli.

Coscinodiscus biangulatus A. Schmidt

Coscinodiscus biangulatus A. Schmidt, 1878, Atlas Diatomaceen-Kunde, pl. 63, fig. 13.

Miocene Distribution: Maryland; New Jersey, Brandywine Lighthouse (A-2283).

Coscinodiscus lineatus Ehrenberg

Coscinodiscus lineatus Ehrenberg, 1839, Abhandl. K. Akad. Wiss Berlin, 1838, p. 129.

Miocene Distribution: Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2286); North Carolina, Elizabeth City; Virginia, Petersburg, Rappahannock Cliffs, Richmond.

Coscinodiscus marginatus Ehrenberg

Coscinodiscus marginatus Ehrenberg, 1843. Abhandl K. Akad. Wiss. Berlin, 1841, p. 412.

Miocene Distribution: Florida, St. Augustine (probably Miocene); Maryland; North Carolina-Virginia, Dismal Swamp; New Jersey, Brandywine Lighthouse (A-2269); Virginia, Browns Mills, Fortress Monroe, Petersburg, Rappahannock Cliffs, Richmond, Stratford Cliffs.

Coscinodiscus nottinghamensis Grunow

Coscinodiscus nottinghamensis Grunow apud Van Heurck, 1883, Syn. Diat. Belgique, pl. 129, fig. 2.

Miocene Distribution: Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2277).

Coscinodiscus obscurus A. Schmidt

Coscinodiscus obscurus A. Schmidt, 1878. Atlas Diatomaceen-Kunde, pl. 61, fig 17.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2277); Virginia.

Coscinodiscus perforatus Ehrenberg

Coscinodiscus perforatus Ehrenberg. 1844, Berichte K. Akad. Wiss. Berlin, 1844, p. 78

Miocene Distribution: Florida, St. Augustine (probably Miocene); Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2283); North Carolina, Elizabeth City; Virginia, Bermuda Tripoli, Fortress Monroe, Richmond.

CRASPEDODISCUS Ehrenberg

Craspedodiscus Coscinodiscus Ehrenberg

Craspedodiscus Coscinodiscus Ehrenberg, 1844, Berichte K. Akad. Wiss. Berlin, 1844, p. 266.

Miocene Distribution: Florida, St. Augustine (probably Miocene); Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2286); North Carolina-Virginia, Dismal Swamp; Virginia, Fortress Monroe, Hollis Creek, Petersburg, Rappahannock Cliffs, Richmond, Stratford Cliffs.

ACTINODISCACEAE

ACTINOPTYCHOIDEAE

ACTINOPTYCHUS Ehrenberg

Actinoptychus Heliopelta Grunow

Actinoptychus Heliopelta Grunow Grunow first named this form, 1881, on Moeller's Type Plate 4-3-5. It is first validly published and credited to Grunow in 1883, Syn. Diat. Belgique, pl. 123, fig. 3.

Woolman (1894) states: "This diatom is especially characteristic of the base and base only of the Miocene diatomaceous clay deposits of the Atlantic Coastal Plains. Wherever it has so far been found, it always has this stratigraphical position." Further on he states: "It is interesting thus to observe the occurrence of Heliopelta at the three localities of Wildwood, Crisfield, and Nottingham, and that at each place it is either at or near the base of the Miocene and above the Eocene."

Miocene Distribution: Maryland; New Jersey, Brandywine Lighthouse (A-2269), Wildwood, Crisfield; North Carolina-Virginia, Dismal Swamp (a small form); Virginia, Bermuda Tripoli.

Actinoptychus Heliopelta var. **versicolor** J. Brun

Actinoptychus Heliopelta var. *versicolor* J. Brun, 1891, Mém. Société Physique et Hist. Nat de Genève, vol. 31, part 2, no. 1, p. 7, pl. 11, fig. 10.

This variety, unlike the typical species, seems to be well distributed through the Miocene deposits of the Atlantic Coast, and therefore cannot be used as a stratigraphic indicator.

Miocene Distribution: Maryland, Pöplein; New Jersey, Atlantic City, Brandywine Lighthouse (A-2286); New Castle (exact location not known).

Actinoptychus undulatus (Kützing) Ralfs

Actinoptychus undulatus (Kützing) Ralfs apud Pritchard, 1861, A History of Infusoria, p. 839.

Actinocyclus undulatus Kützing, 1844, Bacill., p. 132. Bailey pictures this species in 1842, Amer. Jour. Sci., vol. 42, pl 2, fig. 11, but does not give it a name.

Miocene Distribution: Florida, St. Augustine (probably Miocene); Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2269); North Carolina, Elizabeth City; North Carolina-Virginia, Dismal Swamp; Virginia, Bermuda Tripoli, Richmond, Petersburg.

EUPODISCACEAE

AULACODISCOIDEAE

AULACODISCUS Ehrenberg emend. Rattray

Aulacodiscus Rogersii (Bailey) A. Schmidt

Aulacodiscus Rogersii (Bailey) A. Schmidt, 1886, Atlas Diatomaceen-Kunde, pl. 107, fig. 3.

Podiscus Rogersii Bailey, 1844, Amer. Jour. Sci., vol. 46, p. 137, pl. 3, figs 1-2

Miocene Distribution: Florida, St. Augustine (probably Miocene); Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2286); North Carolina, Elizabeth City; North Carolina-Virginia, Dismal Swamp; Virginia, Browns Mills, Bermuda Tripoli, Hollis Creek, Rappahannock Cliffs, Richmond, Stratford Cliffs.

EUPODISCOIDEAE

ACTINOCYCLUS Ehrenberg

Actinocyclus Ehrenbergii Ralfs

Actinocyclus Ehrenbergii Ralfs apud Pritchard, 1861, A History of Infusoria, p. 834.

Miocene Distribution: Florida, St. Augustine (probably Miocene); Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2278); North Carolina-Virginia, Dismal Swamp; Virginia, Browns Mills, Bermuda Tripoli, Hollis Creek, Meherrin River, Petersburg, Rappahannock Cliffs, Richmond, Stratford Cliffs.

Actinocyclus moniliformis Ralfs

Actinocyclus moniliformis Ralfs apud Pritchard, 1861, A History of Infusoria, p. 834.

Miocene Distribution: Maryland; New Jersey, Brandywine Lighthouse (A-2277); Virginia, Fortress Monroe.

AULISCUS Ehrenberg

Auliscus pruniosus Bailey

Auliscus pruniosus Bailey, 1853. Smithsonian Contributions to Knowledge, vol. 7, p. 5, figs. 5-8.

Miocene Distribution: Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2286).

BIDDULPHINEAE

BIDDULPHIACEAE

BIDDULPHIOIDEAE

BIDDULPHIA Gray

Biddulphia semicircularis (Brightwell) Boyer

Biddulphia semicircularis (Brightwell) Boyer, 1901, Proc. Acad. Nat. Sci. Phila., vol. 52, p. 726.

Triceratium semicirculare Brightwell, 1853, Quart. Jour. Micro. Sci., vol. 1, p. 252, pl 4, fig. 21.

Miocene Distribution: Florida, St. Augustine (probably Miocene); Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2277); North Carolina-Virginia, Dismal Swamp; Virginia, Bermuda Tripoli.

Biddulphia tessellata (Greville) Boyer

Biddulphia tessellata (Greville) Boyer, 1901, Proc. Acad. Nat. Sci. Phila., vol. 52, p. 723.
Triceratium tessellatum Greville, 1861, Trans. Micro. Soc., vol. 9, p. 71, pl. 8, fig. 14.

Miocene Distribution: Maryland; New Jersey, Brandywine Lighthouse (A-2277).

Biddulphia Tuomeyii (Bailey) Roper

Biddulphia Tuomeyii (Bailey) Roper, 1859, Trans. Micro. Soc., vol. 7, p. 8, pl. 1, figs. 1-2.
Zygoceros Tuomeyii Bailey, 1844, Amer Jour Sci., vol. 46, p. 138, pl. 3, figs. 3-9.

Miocene Distribution: Florida, St. Augustine (probably Miocene); Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2286); North Carolina-Virginia; Dismal Swamp; Virginia, Richmond, Petersburg.

PENNALES

ARAPHIDEAE

FRAGILARIACEAE

FRAGILARIOIDEAE

DIMEROGRAMMA Ralfs

Dimerogramma brandywinensis nov. sp. Figure I

Valva linearis; apicibus latibus cuneatibus, 43μ longa, 6μ lata; striis distinctis punctatis, 9 in 10μ. Pseudoraphis lata. Type (A-2296).

This species is in many respects quite different from other species in the genus *Dimerogramma*. However, if we accept *D. Novae-Caesarae* as being in this genus, this species would also belong in it. In some respects this species seems to be akin to the genus *Raphoneis*.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2269, 2296).

Dimerogramma Novae-Caesarae Kain and Shultze

Dimerogramma Novae-Caesarae Kain and Shultze, 1889, Bull. Torrey Bot Club, vol 16, no. 3, p. 74, pl. 89, figs. 1, 1b.

Miocene Distribution: Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2286).

RHAPHONEIS Ehrenberg

Rhaphoneis amphiceros Ehrenberg

Rhaphoneis amphiceros Ehrenberg, 1844, Berichte K. Akad. Wiss. Berlin, 1844, p. 87.

Miocene Distribution: Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2269); North Carolina, Elizabeth City; Virginia, Petersburg, Richmond.

Rhaphoneis fragilaroidea nov. sp. Figure 5

Valva lanceolata, 27μ longa, 9μ lata, apicibus attenuatis rostratis; striis distinctis punctatis, 14 in 10μ. Puncta 14 in 10μ. Pseudoraphis angusta et indistincta. Type (A-2296).

I have given the species this name because of its superficial resemblance to some of the species of the genus *Fragilaria*.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2268-2270, 2296).

Rhaphoneis gemmifera Ehrenberg

Rhaphoneis gemmifera Ehrenberg, 1844. Berichte K. Akad. Wiss. Berlin, 1844, p 87.

Miocene Distribution: Florida, St. Augustine (probably Miocene); Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2286); Virginia, Rappahannock Cliffs.

Rhaphoneis gemmifera var. **elegans** Pantoscek and Grunow

Rhaphoneis gemmifera var. *elegans* Pantoscek and Grunow apud Pantoscek, 1903, Foss. Bacill. Ungarns, part I, p. 36, pl. 2, fig. 21.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2269).

Rhaphoneis granulata nov. sp. Figures 3 and 4

Valva elliptica-lanceolata, 17μ longa, 15.5 lata, apicibus rostratis; striis distinctis punctatis, 15 in 10μ. Puncta 15.5 in 10μ. Pseudoraphis absens. Type (A-2296).

Because of the apparent lack of a pseudoraphe on the valve, I am somewhat doubtful as to just where this species belongs. However, as the pseudoraphe in *Rhaphoneis* is very variable this is perhaps not as important a character as it at first seems. The arrangement of the striae, particularly at the margin of the valve, is that of several species of *Rhaphoneis*. Also the characters of the apices of the valve are characteristic of this genus.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2268-70, 2296).

Rhaphoneis scalaris Ehrenberg

Rhaphoneis scalaris Ehrenberg, 1844, Berichte K Akad Wiss. Berlin, 1844, p. 271.

Miocene Distribution: Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2278); Virginia, Bermuda Tripoli.

THALASSIONEMA Grunow

Thalassionema nitzschioides var. **obtusa** Grunow

Thalassionema nitzschioides var. *obtusa* Grunow apud Van Heurck, 1881, Syn. Diat. Belgique, pl. 43, fig.6.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2283); Virginia, Rappahannock.

SCEPTRONEIS Ehrenberg

Sceptroneis caducens Ehrenberg

Sceptroneis caducens Ehrenberg, 1844, Berichte K. Akad. Wiss. Berlin, 1844, p. 271.

Miocene Distribution: Maryland; New Jersey, Atlantic City, Brandywine Lighthouse (A-2286); Virginia, Bermuda Tripoli.

BIRAPHIDINEAE

NAVICULACEAE

NAVICULOIDEAE

DIPLONEIS Ehrenberg

Diploneis crabro var. **limitanea** (A. Schmidt) Cleve

Diploneis crabro var. *limitanea* (A. Schmidt) Cl., 1894, K. Sv. Vet. Akad. Handl., vol. 26, no 2, p. 100.

Navicula limitanea A. Schmidt, 1875, Atlas Diatomaceen-Kunde, pl. 11, fig. 23.

Miocene Distribution: Maryland; New Jersey, Brandywine Lighthouse (A-2286).

Diploneis Szontaghii Pantocsek Figure 2

Diploneis Szontaghii Pantocsek, 1903, Beitrage zur Kenntnis der Fossilen Bacillarien Ungarns, p. 31, pl. 3, fig. 25, pl. 28, fig. 284.

This species was described from the fossil deposits of Hungary. This is the first published record of this species in the Miocene deposits of the Atlantic Coast. The specimens found at Brandywine Lighthouse are slightly constricted. Thus they might be considered a new variety, but for the present it seems wise to place them under the species as they agree with Pantoscek's description in all other respects.

This species is mainly found in the lower levels of the deposit.

Miocene Distribution: New Jersey, Brandywine Lighthouse (A-2269).

SUMMARY

From this study it is clear that the diatoms from 596-517 ft. belong to the Miocene period. This deposit in general aspect is very similar to the Calvert deposits of the Eastern Coast of the United States.

Of the 36 species studied, three are new and two are for the first time recorded from the Miocene of Eastern United States. Both of these forms, *Diploneis Szontaghii* and *Rhaphoneis gemmifera* var. *elegans* were first described from the Miocene of Hungary. Two of the varieties and one form of *Melosira sulcata* have not been definitely enough separated from the species so that we can be sure of their distribution.

As for the remaining 29 species and varieties, it is interesting to note that 95 percent have been found in Maryland, 73 percent in Virginia, and 69 percent in New Jersey. Thus it is clear that this deposit is more similar to the deposit of Maryland than to those of Virginia or New Jersey. It is also interesting to note that this deposit is more similar to those of the Miocene deposits as found in the South, i. e., Florida, Maryland, North Carolina, and Virginia, than to those of New Jersey. Thirty-five percent of the species studied have Brandywine Lighthouse as the northern record of their Miocene range. These findings are in accord with those of Richards and Harbison for the Mollusca fauna.

Though the deposit of diatoms is all of Miocene age, it does seem to divide itself into two parts. The deposits between 596-558 ft. seem to be older than the subsequent deposits, for in these layers we have the typical *Actinoptychus Heliopelta* with the starred central area, which is absent from the deposits above 558 ft. As stated above, this form is characteristic of the oldest Miocene diatom deposits (Calvert Formation) and is not found in Miocene deposits of later age.

As stated by other workers, the deposits rich in mollusks are relatively poor in diatoms, and in the rich diatomaceous layers few mollusca are present. Thus these two groups supplement each other to a large extent in such studies.

BIBLIOGRAPHY

BAILEY, J. W. 1842. A sketch of the Infusoria, of the family Bacillaria with some account of the most interesting species which have been found in recent or fossil state in the United States. Amer. Jour. Sci, vol. 42, pp. 88-105.

————. 1844. Account of some new Infusorial forms discovered in the fossil Infusoria from Petersburg, Virginia and Piscataway, Maryland. Amer. Jour. Sci., vol. 46, pp. 137-141.

————. 1844. Notice of a memoir of C. G. Ehrenberg, "On the extent and influence of microscopic life in North and South America" Amer. Jour. Sci., vol. 46, pp. 297-313.

————. 1845 Ehrenberg's observations on the fossil Infusoria of Virginia and Maryland and comparison of the same with those found in the chalk formations of Europe and Africa. Amer. Jour. Sci, vol 48, pp. 201-204.

————. 1845. Notice of some new localities of Infusoria, fossil and recent. Amer. Jour. Sci., vol. 48, pp. 321-343.

————. 1851. Miscellaneous notes: Fossil Infusoria of Maryland. Amer. Jour. Sci., vol. 11, series 2, p. 85.

————. 1851. Miscellaneous notes: Fossil Infusoria of the Southern rice fields. Amer. Jour. Sci., vol. 11, series 2, p. 85.

BOYER, C. S. 1895 A fossil marine diatomaceous deposit at St. Augustine, Florida. Bull. Torrey Bot. Club, vol. 22, no. 4, pp. 171-174.

————. 1900 The Biddulphoid forms of North American Diatomacea. Proc. Acad. Nat. Sci. Phila., vol. 52, pp. 685-748.

————. 1904. Maryland Geological Survey: Thallophyta-Diatomacea, pp. 487-507.

CORYELL, MARTIN. 1876. Diatomaceous sands of Richmond, Va. Trans. Amer. Inst. Min. Eng., vol. 4. pp. 230-232

————. 1881. Diatomaceous sands of Richmond, Va. The Virginias, vol. 2, pp. 6-7.

EHRENBERG, C. G. 1843. Verbreitung und Einfluss des mikroskopischen Lebens in Sud- und Nord-Amerika. Abhandl. K. Akad. Wiss. Berlin, 1841, pp. 291-446.

————. 1844. Eine mittheilung uber zwei neue Lager von Gebirgsmassen aus Infusorien als Meeres-Absatz in Nord-Amerika und eine vergleichung derselben mit den organischen Kreide-Gebilden in Europa und Afrika. Berichte K. Akad. Wiss. Berlin, 1844, pp. 57-98

————. 1844. Legte seine Untersuchungen uber die kleinsten Lebensformen im Quellenlande des Euphrats und Araxes, so wie reiche marine tripelbildung von den Bermuda-Inseln vor. Berichte K. Akad der Wiss. Berlin, 1844, pp 253-275.

————. 1854-56. Zur Mikrogeologie das Erden und Felsen Schaffende Wirken des unsichtbar kleinen selbstandigen Lebens auf der Erde. Fortsetzung. Enthaltend: Das nordliche Amerika, die Sudlichen vereinigten Staaten, Californien und Oregon mit allem Festland und den Inseln bis zum Nordpol. Folio. Leipzig

HENBEST, L. G., K. E. LOHMAN, and W. C. MANSFIELD. 1939. Foraminifera, diatoms, and mollusks from test wells near Elizabeth City, North Carolina. U. S. Dept. Interior, Geol. Survey, Prof. Paper 189-G, pp. 217-227.

KAIN, H. C., and E. A. SCHULTZE. 1889. On a fossil marine diatomaceous deposit from Atlantic City, New Jersey. Bull. Torrey Bot. Club, vol. 16, no. 3, pp. 71-76.

————. 1889. On a fossil marine diatomaceous deposit from Atlantic City, New Jersey. Part II. Bull. Torrey Bot. Club, vol. 16, no. 8, pp. 207-210.

MICHELS, JOHN. 1880. The Richmond diatomaceous earth. Science, vol. 1, p. 222.

ROGERS, W. B. 1882. The Infusorial deposits of Virginia in the Fort Monroe artesian well. The Virginias, vol. 3, pp. 151-152 Also printed in 1884 in the Geology of the Virginias, pp. 731-736

STODDARD, CHARLES. 1877. A contribution to Microgeology. Proc. Bost. Soc. Nat. Hist., vol. 18, pp. 206-209.

WOOLMAN, LEWIS. 1888. An interesting discovery. The Micro. Bull. and Sci. News., vol. 5, no. 6, p. 41.

————. 1889. Artesian wells, Atlantic City, New Jersey. Geol. Surv. N. J., Ann. Report State Geol. for 1889, pp. 89-99.

————. 1890. An outcrop of fossil diatoms near Shiloh, New Jersey. The Micro. Bull. and Sci. News., vol. 7, no. 2, p. 9.

————. 1891. Geology of artesian wells at Atlantic City, New Jersey. Proc. Acad. Nat. Sci. Phila., vol. 42, pp. 132-147, p. 444.

————. 1891. Communications containing data with regards to diatomaceous clay etc.,—J. G. Smock's artesian and other bored wells. Geol. Surv. N. J., Ann. Report State Geol. for 1890, pp. 259-283.

————. 1892. A review of artesian horizon in Southern New Jersey. Geol. Surv. N. J., Ann. Report State Geol. for 1891, pp. 223-232.

————. 1893. Artesian wells in Southern New Jersey. Geol. Surv. N. J., Ann. Report State Geol. for 1892, pp. 275-311.

————. 1894. Artesian wells and water horizon in Southern New Jersey, with economical, geological and paleontological notes. Geol. Surv. N. J., Ann. Report State Geol. for 1893, pp. 389-421.

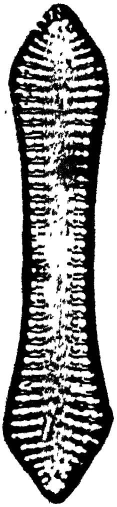
————. 1895. Report on artesian wells in Southern New Jersey. Geol. Surv. N. J., Ann. Report State Geol. for 1894, pp. 153-220.

————. 1896. Report on artesian wells. Geol. Surv. N. J., Ann. Report State Geol. for 1895, pp. 65-95.

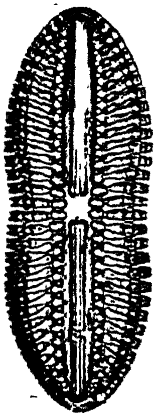
————. 1897. Report on artesian wells—stratigraphy of the Fish House Black Clays. Geol. Surv. N. J., Ann. Report State Geol. for 1896, pp. 95-255.

————. 1898. Fossil mollusks and diatoms from Dismal Swamp, Virginia and North Carolina—indications of the geological age of the deposit. With notes on diatoms by C. S. Boyer. Proc. Acad Nat. Sci. Phila., vol 50, pp. 414-428.

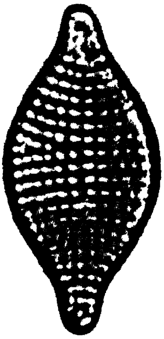
————. 1900. Artesian wells in New Jersey Geol. Surv. N. J., Ann. Report State Geol. for 1899, pp. 57-139.



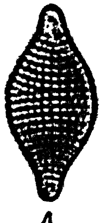
1.



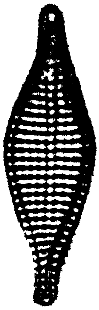
2.



3.



4.



5.

Explanation of Plate

Fig. 1.	*Dimerogramma brandywinensis* n. sp.	x 1500.
Fig. 2.	*Diploneis Szontaghii* Pantocsek	x 1000.
Fig. 3.	*Raphoneis granulata* n. sp.	x 2500.
Fig. 4.	*Raphoneis granulata* n. sp.	x 1500.
Fig. 5.	*Raphoneis fragilaroidea* n. sp.	x 1500.

NOTULAE NATURAE

NUMBER 134 OF JUNE 14, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON THE GEOLOGY AND PALEONTOLOGY OF THE CAPE MAY CANAL, NEW JERSEY

BY HORACE G. RICHARDS
Associate Curator, Department of Geology and Paleontology,
The Academy of Natural Sciences of Philadelphia

The construction of a canal across the southern tip of New Jersey from the Atlantic Ocean to Delaware Bay has afforded an opportunity for obtaining additional information on the geology of the region. The canal extends for about four miles from the mouth of New England Creek on Delaware Bay to Cape May Harbor near Schelenger's Landing. The canal is about 100 feet wide and 14 feet in depth.

At the suggestion of Mr. Charles M. B. Cadwalader, President of the Academy of Natural Sciences, the writer made several visits to Cape May during the process of the construction to record the geology as shown by the excavations. The field work was made possible by a fund provided by Mr. Cadwalader. The work was facilitated by the cooperation of the United States Engineer Office, particularly Mr. W. H. Bruce, Resident Engineer at Cape May, New Jersey. The writer had previously examined the samples from test borings for the canal made in 1936. Additional notes on these were furnished by Mr. Meredith E. Johnson, State Geologist of New Jersey.

All the excavations, as well as the hydraulic dredging and borings, were limited to Pleistocene or later sediments. The surface deposits of the entire Cape May County area have been mapped as belonging to the Cape May formation, of late Pleistocene age. Near the shore of the Ocean and Bay they are covered with Recent peat and marsh deposits.

Sections along the Cape May Canal

The following sections were taken by the writer during the construction of the Canal. In order to give a more complete picture of the subsurface geology, notes on the boreholes are appended when they are in close proximity to the section.

A. *Near Schelenger's Landing, eastern end of Canal*

+ 20 to + 15 feet	Pebbly sand
+ 15 to + 13 feet	Sand
+ 13 to + 8 feet	Pebbly sand
+ 8 to 0 feet	Fine dark sand

. . . . sea level . . . .

+ 1.0 to — 14.4 feet	Very fine compact yellow sand
— 14.4 to — 21.4 feet	Rusty brown slightly clayey medium to coarse sand and small gravel
— 21.4 to — 25.0 feet	Fine to coarse yellow sand with few pebbles

B. *Cape Island Creek Marsh*

Here the canal banks are only about two feet above sea level and only recent marsh deposits were observed along the banks. The hydraulic dredging passed below the marsh into a highly fossiliferous sand. The fossils were strewn along the spoil banks of the Canal where they were readily collected. Apparently the fossiliferous portion of the Cape May formation extends closer to the surface here than elsewhere along the Canal, for this is the only place where fossils were obtained. The maximum depth of the dredging was about —14 feet. The fauna contained a mixture of northern and southern species and is discussed later in this paper.

C. *Pennsylvania-Reading Seashore Line Railroad bridge*

+ 8 to + 4 feet	White sand with a few pebbles
+ 4 to + 2 feet	Coarse yellow sand with pebbles
+ 2 to 0 feet	Fine white sand, no pebbles

. . . . sea level . . . .

0 to — 8.3 feet	Fine drab yellow sand
— 8.3 to — 19.8 feet	Fine to coarse yellow sand
— 19.8 to — 25.0 feet	Fine to medium yellow sand

D. *Broadway Bridge*

+ 15 to + 10 feet	Yellow sand with streaks of gravel
+ 10 to + 3 feet	Yellow sand with less gravel
+ 3 to 0 feet	Fine gray sand with no pebbles

. . . . sea level . . . .

— 0.8 to — 10.2 feet	Yellow coarse sand and small gravel
— 10.2 to — 25.0 feet	Fine to coarse light yellow sand
— 25.0 feet	Light yellow fine to coarse sand and gravel

E. *Bay Shore Road*

+ 8 to + 7 feet	Sand and roots
+ 7 to + 2 feet	Sand and gravel (similar to that exposed along Delaware Bay bluff at Town Bank)
+ 5 to — 7.8 feet	Very fine yellow sand
— 7.8 to — 15 2 feet	Medium light yellow sand
— 15.2 to — 25.0 feet	Fine yellow sand with a few coarser grains
— 25.0 feet	Fine to coarse light yellow sand

F. *Between Bay Shore Road and Delaware Bay*

+ 16 to + 4 feet	White sand with a few small pebbles near the base (probably partly wind-blown)
+ 4 to + 2 feet	Cross bedded sand
+ 2 to 0 feet	Pebbly sand, horizontally bedded

G. *Near mouth New England Creek, on Delaware Bay*

Nearer the Delaware Bay entrance of the Canal, the fill was found to consist entirely of fine white wind-blown sand. The pebbly sand apparently is well below sea level. For the final hundred yards near the Bay, the fill consisted of peat with plant remains and shells of Recent age.

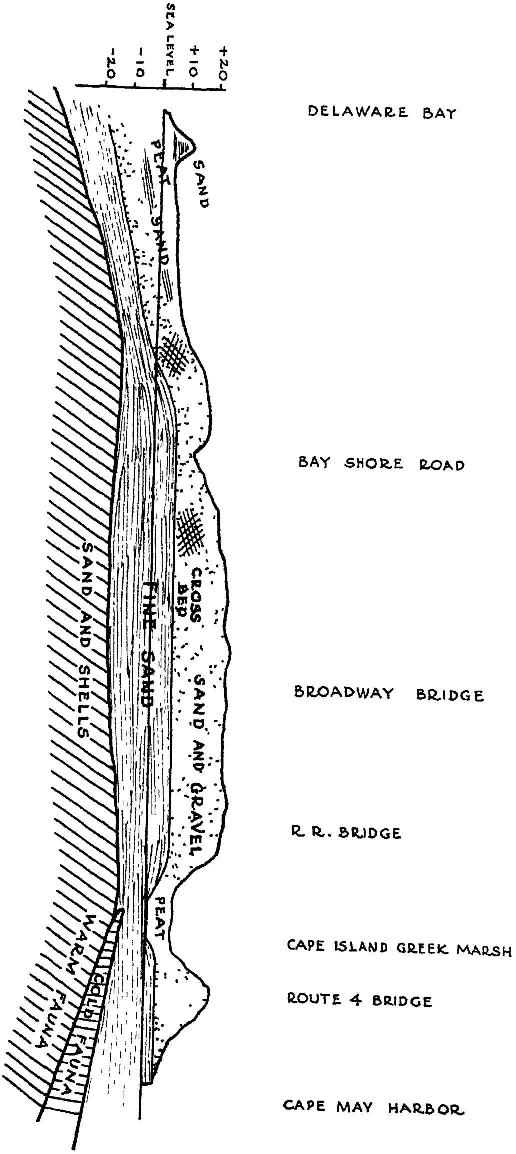
Borehole number 5 was put down in the sand dunes immediately south of the Delaware Bay entrance of the Canal.

+ 6.3 to — 0.7 feet	Fine to coarse light gray sand, small pebbles and plant remains
— 0.7 to — 4.4 feet	Fine to medium sand, a few coarse grains
— 4.4 to — 25.0 feet	Soft gray clay with Recent plant remains
— 25.0 feet	Soft gray clay (Recent)

Other boreholes

A number of preliminary boreholes were drilled both north and south of the final line of the Canal. Several of these revealed fossils. Borehole number 1 at the railroad crossing of Mill Creek showed shell fragments at —25 feet; borehole number 3 near the head of Mill Creek showed shell fragments (particularly *Venus campechiensis*) between —20 and —25 feet, while borehole number 4 at the Bay Shore Road crossing of Coxall Creek showed similar shell fragments between —14 and —25 feet. In all cases the fossiliferous sands were overlaid by a fine gray sand, probably similar to the sand exposed at water level along the eastern part of the Canal.

South of the Canal, borehole number 16, located about 0.2 mile north of the junction of the main railroad with the spur leading to the west, yielded shells between —10 and —26 feet. Here the sand was overlaid by a coarse sand and gravel. The situation here is probably similar to that of locality B where the extensive fauna was dredged.



Diagrammatic cross-section of Cape May Canal.

A generalized cross section across the Cape is shown in accompanying diagram. The following levels may be recognized:

1. RECENT—Peat and dune sand near the Delaware Bay entrance.

2. CAPE MAY — Sand and gravel. A non-marine deposit with varying amounts of gravel extending from the surface of the land to slightly above sea level. There are occasional patches of pure sand, possibly wind-blown, and occasionally pockets of strongly cross-bedded sand and fine gravel.

3. CAPE MAY—Fine sand usually from slightly above sea level to —10 feet. The sand is very compact and is more resistant to erosion than the overlying deposits. There are occasional lenses of clay. No fossils have been observed.

4. CAPE MAY—Marine sand and clay. This begins between —10 and —25 feet and extends below the limits of the excavations to at least —90 feet. The fauna from locality B contains a mixture of warm- and cold-water mollusks. It is believed that the upper part of the fossiliferous deposit contains the northern species while the lower part contains the southern species.

The Cape May formation apparently represents the entire duration of the Pleistocene between the last major interglacial stage and the Recent. The subsurface beds carrying the warm fauna are probably of interglacial age, while the slightly higher beds with the cold-water fossils probably represent the beginning of the Wisconsin glaciation. It is not probable that the cold-water fauna extends very far inland if it were deposited during a lowering sea level. A similar situation has been noted on Long Island and Nantucket where the warm-water Gardiners clay is overlaid by the Jacob sand with its cooler-water fauna.[1] The non-marine sands and gravel which outcrop over the entire Cape are later than the marine deposits and probably represent glacial fluvial deposits laid down during or after the climax of the Wisconsin glaciation. The finding of large (8 inch) boulders near Dennisville, Cape May County, New Jersey, adds weight to this belief. The fine sand (Zone 3) between the marine and fluvial deposits may represent the transitional phase.

The warm-water phase of the Cape May formation was encountered in the hydraulic dredgings at various localities along the New Jersey coast, particularly at Two Mile Beach, Cape May County.[2] That it extends to a considerable depth is shown by various wells: Wildwood, New Jersey (132 feet), Cape May, New Jersey (90 feet), Rio Grande, New Jersey (193 feet), Brandywine Lighthouse (128 feet), Lewes, Delaware (125 feet).

---

[1] MacClintock, Paul, and Horace G. Richards. Correlation of Late Pleistocene Marine and Glacial Deposits of New Jersey and New York. Bull. Geol Soc. Amer., Vol. 47, pp. 289-338, (1936).

[2] Richards, Horace G. Marine Fossils from New Jersey indicating a Mild Interglacial Stage. Proc. Amer. Philos. Soc., Vol. 72, pp 181-214, (1933).

In most of the above mentioned wells the fossiliferous sand and clay of the Cape May formation is overlaid by a non-fossiliferous sand and gravel. It also seems significant that at most of the fossil localities of the Pamlico formation (= Cape May) in the Southern States, the fossiliferous sands and clays are overlaid by a non-fossiliferous sand averaging about ten feet in thickness. This relationship is clearly shown at Cornfield Harbor, Maryland, at various localities along the Neuse River in North Carolina, along the Intra-Coastal Canal near Myrtle Beach, South Carolina, and at Rose Bluff on the St. Marys River in Florida.

While the cold-water fauna has not been found in place in New Jersey, a number of cold-water mollusks have been found washed onto the New Jersey beaches. It was believed that they were deposited off shore during Wisconsin time when the shore line was lower and east of its present position. (See Richards, 1933, and MacClintock and Richards, 1936.)

Future work will probably show that the term Cape May formation should not be used for all these phases. For the present, the formation is merely divided into the following zones or phases.

4. Fluvial (sand and gravel) Wisconsin and post Wisconsin
3. Transitional (fine sand)
2. Glacial marine (sand with cold-water fauna) Early Wisconsin
1. Interglacial marine (sand and clay with warm-water fauna) Last major interglacial

As stated above, the fossils from the spoil banks were a mixture of northern and southern species. While it is impossible to separate the faunas, it is believed that the northern species are from the upper (Wisconsin) deposits while the southern species are from the lower (interglacial) deposit. The majority of the fossils previously recorded from the Cape May formation have been from the lower level.

Forty-four species have been collected from the spoil banks at locality B (Cape Island Creek marsh). Of these one is new and fourteen are absent or very rare in New Jersey waters today, eight being of southern affinity and six of northern.

A complete set of the fossils is at the Academy of Natural Sciences of Philadelphia while some duplicates are at the New Jersey State Museum in Trenton, New Jersey.

The accompanying table records the species found, together with their distribution, Pleistocene and Recent.

PELECYPODA	North of N. J.		N. J.	South of N. J.	
	Rec.	Pleist.	Recent	Rec.	Pleist.
Nucula major new species	a	a	—	—	—
Arca ponderosa Say	—	—	—	×	×
A. transversa Say	×	×	×	×	×
Ostrea virginica Gmelin	×	×	×	×	×
Mytilus edulis Linné	×	×	×	×	×
Pandora trilineata Say	×	×	×	r	r
Astarte castanea (Say)	×	×	×	r	—
Venericardia borealis (Conrad)	×	×	×	r	—
Venericardia tridentata Say	—	—	—	×	×
Diplodonta punctata (Say)	—	—	—	×	×
Phacoides sp.	—	—	—	×	×
Venus campechiensis Gmelin	—	—	r	×	×
Gemma gemma (Totten)	×	×	×	×	×
Petricola pholadiformis Lamarck	×	×	×	×	×
Macoma balthica (Linné)	×	×	×	r	r
Ensis directus (Conrad)	×	×	×	×	×
Mactra solidissima Dillwyn	×	×	×	×	×
Mulinia lateralis (Say)	×	×	×	×	×
Mesodesma deauratum Turton	×	×	—	—	—
Mesodesma arctatum Conrad	×	×	r	—	—
Mya arenaria Linné	×	×	×	r	r
Corbula contracta Say	r	—	×	×	×
Crenella glandula Totten	×	×	—	r	×
GASTROPODA					
Crepidula fornicata (Linné)	×	×	×	×	×
Crepidula plana Say	×	×	×	×	×
Crepidula convexa Say	×	×	×	×	×
Nassarius obsoleta (Say)	×	×	×	×	×
Nassarius trivittata (Say)	×	×	×	×	×
Nassarius vibex (Say)	—	—	—	×	×
Nassarius acuta (Say)	—	—	—	×	×
Polinices duplicata (Say)	×	×	×	×	×
Polinices heros (Say)	×	×	×	r	r
Urosalpinx cinerea (Say)	×	×	×	×	×
Eupleura caudata (Say)	×	×	×	×	×
Fulgur canaliculata (Say)	×	×	×	×	×
Fulgur carica (Gmelin)	×	×	×	×	×
Buccinum undatum Linné	×	×	r	—	—
Colus pubescens Verrill	×	—	—	—	—
Neptunea stonei (Pilsbry)	—	×	—	—	—
Olivella mutica (Say)	—	—	—	×	×
Turbonilla conradi Bush	×	×	×	×	×
Columbella lunata (Say)	×	×	×	×	×

ECHINODERMATA	North of N. J.		N. J.	South of N. J.	
	Rec.	Pleist.	Recent	Rec.	Pleist.
Mellita quinquesperforata Leske	—	—	—	×	×
PORIFERA					
Cliona celata Grant	×	×	×	×	×
BRYOZOA					
Hippoporidra edax Bush	—	—	×	×	×

× present r rare a allied species — absent

CHARACTERISTIC NORTHERN SPECIES

PELECYPODA

Nucula major new species Figures 5, 6

Shell large for the genus; solid, rounded. Anterior end rounded; posterior end broken. Outer surface covered with concentric lines; inner surface nacerous. Six prominent posterior teeth; beak and adjacent posterior teeth lacking in this specimen. Anterior teeth broken away.

Dimensions: Type (A.N.S.P. 15938) length (incomplete) 21.5 mm.; estimated complete length 25.0 mm.; width 18.5 mm.

Type Locality: Dredged from Cape May Canal, Cape May County, New Jersey.

Age: Pleistocene (probably Wisconsin age).

The single specimen is a broken right valve. Although the shell is imperfect, the sculpture and hinge teeth definitely place it in the genus *Nucula.* It is closest to *N. tenuis* Montagu and *N. expansa* Reeve from the Pleistocene and Recent from Maine northward, although it is easily distinguished by its much larger size. The length of *N. tenuis* is 11 mm. while that of *N. expansa* is 14 mm.

Crenella glandula Totten

Known from the Pleistocene at Sankaty Head, Nantucket, Massachusetts, and from present seas from Labrador to North Carolina, but rarely found south of Cape Cod. Two specimens from the Canal excavations.

Astarte castanea (Say)

Although this species lives today in New Jersey waters, it is very rare south of Cape May. This species together with *Venericardia borealis* Conrad was taken from the upper part of the Cape May formation in shallow excavations at Cape May, New Jersey (Richards, 1933, p. 189). This may be equivalent to the upper part of the fossil zone struck in the Cape May Canal. This is a common species on the spoil banks.

Venericardia borealis (Conrad)

Similar distribution and occurrence as *A. castanea* Say.

Mesodesma arctatum Conrad

A northern clam which is present, but very rare, in the Pleistocene and Recent of New Jersey. Numerous in the Canal excavations.

Mesodesma deauratum Turton

A few young individuals from the spoil banks were referred to this species. Not known from Recent seas south of Georges Bank.

Pandora trilineata Say

Heavy shell; similar to those found in present seas north of New Jersey.

GASTROPODA

Buccinum undatum Linné

A northern species known only from deep water as far south as New Jersey. It has been taken from the Cape May formation at Two Mile Beach, New Jersey, and from beach wash at various places along the New Jersey coast. Several individuals were collected from the Canal spoil banks.

Colus pubescens Verrill

A northern species known from Cape Cod northward to the Arctic and in deep water south of Cape Cod. This is the first record from the Pleistocene. One specimen only.

Neptunea stonei (Pilsbry)

Described from the beach wash at Point Pleasant, New Jersey, as a fossil of unknown age. It has subsequently been found from deposits referred to early Wisconsin age on Long Island and Nantucket (MacClintock and Richards, 1936, p. 330). Very common in the Canal excavations, but usually broken. It is not known living from any sea, but is related to Arctic species.

CHARACTERISTIC SOUTHERN SPECIES

PELECYPODA

Venus campechiensis Gmelin

This is the most abundant species from the Canal spoil banks. Although *V. campechiensis* lives in New Jersey waters today, it is rare and always small. These fossils are heavy and thick and similar to those from North Carolina and southward.

Arca ponderosa Say

Characteristic of the interglacial Pleistocene from Nantucket southward. Unknown (or exceedingly rare) in recent seas north of Cape Hatteras. Common in the Cape May formation at Two Mile Beach, New Jersey; several specimens from the Canal.

Venericardia tridentata Say

A southern species that has its northern limit in Delaware Bay. First record from the Pleistocene of New Jersey.

Diplodonta punctata (Say)

One individual, slightly less convex and less circular than typical.

Phacoides sp.

Several badly worn shells resembling the warm water *P. crenella* Dall.

GASTROPODA

Nassarius vibex (Say)

Except for a few old records, this species is not known from recent seas north of Virginia. Common in the Pleistocene at Two Mile Beach, New Jersey, and elsewhere. (Richards, 1933). Several individuals from the Canal.

Nassarius acuta (Say)

Not known living north of North Carolina and this is the first record from the Pleistocene north of the Dismal Swamp (Va.-N. C.).

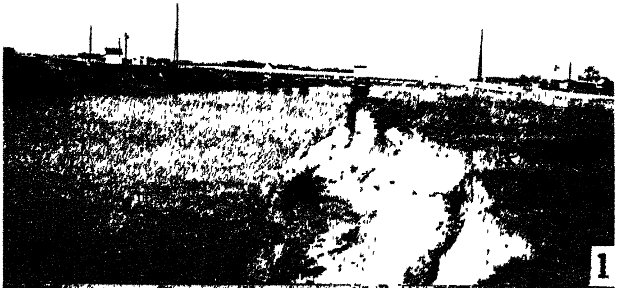
Olivella mutica (Say)

Not known living north of North Carolina and this is the first record from the Pleistocene north of the Dismal Swamp (Va.-N. C.).

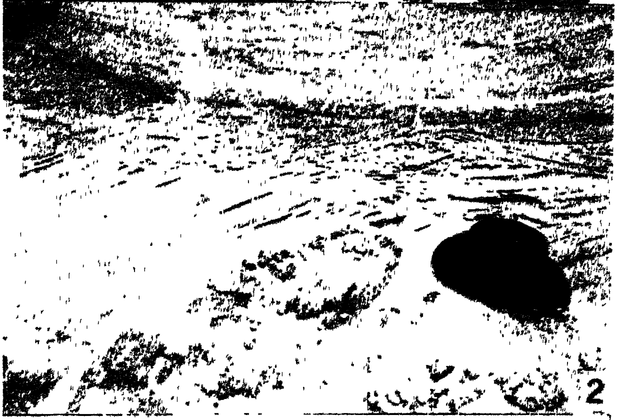
ECHINODERMATA

Mellita quinquesperforata Leske

Fragments of this Sand Dollar were numerous in the spoil banks. As far as is known this species has not been found alive north of Virginia. It is, however, common in the Cape May formation and dead specimens are occasionally washed onto the New Jersey beaches, possibly from a submarine fossil deposit.



1



2

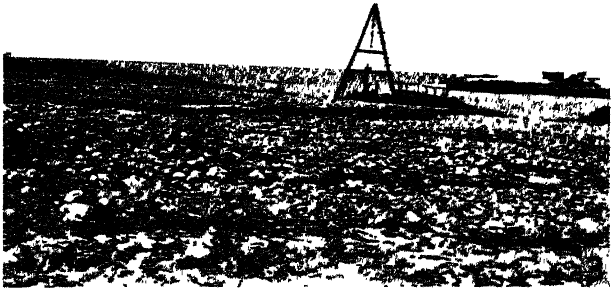
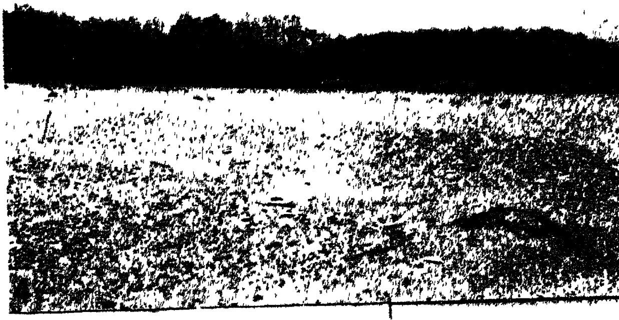
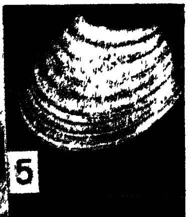
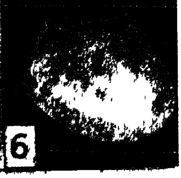


Fig. 1.—Cape May Canal at Broadway bridge. Fig. 2.—Cross-bedded sand near Bay Shore Road. Fig. 3.—Peat in spoil banks at Delaware Bay entrance of Canal.





5



6

7

8

Fig. 4.—Fossils on spoil bank. Figs. 5, 6.—*Nucula major* new species (× 1). Fig. 7.—Upper sand deposit during excavation near Schelenger's Landing. Fig 8.—Section of Canal near Broadway.

NOTULAE NATURAE

NUMBER 135 OF JUNE 21, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTIONS OF NEW GENERA AND SPECIES OF THE DIPTEROUS FAMILY EPHYDRIDAE. PAPER XIV[1]

BY E. T. CRESSON, JR.

Associate Curator, Department of Insects, The Academy of Natural Sciences of Philadelphia

This series of papers consists of descriptions of new forms of the Ephydridae encountered in the study of material sent to me for identification by various institutions and collectors. The present paper considers three new genera and eight new species, and the types of all but two of the latter are in the collection of the Academy.

HOPLOAEGIS[2] new genus

The type-species of this genus was described as a *Stratiothyrea*, although at that time the probable incorrectness of such assignment was recognized. Since then, on the receipt by the writer of material of true *Stratiothyrea*, the error was apparent. The genotype is a peculiar species which does not seem to be closely associated with any other I have seen. The position of the ocellars and the slender legs suggest a relationship to *Psilopa*, but facial and antennal structure, as well as the absence of the anterior notopleural, would suggest a place near *Gymnopa*, and these latter characters influence me in assigning it to the Gymnopini. The ample quadrate scutellum with its long apical pair of bristle-bearing tubercles is a prominent feature.

Genotype: *Stratiothyrea browni* Cresson, 1925.

Vertex sharp, concaved, with strong inner verticals (no outer verticals apparent in the genotype); posterior ocelli slightly removed from vertex. on a weak tumor; no postocellars; ocellars strong, situated caudad of anterior ocellus, slightly more separated than are the posterior ocelli; no frontals nor frontorbitals seem apparent. Fronto-facial profile conjunction depressed. Face without definite foveae or carina; facialia not defined except by the transverse rugae and series of dorsomesally inclined facials; parafacies linear. Postbucca not broad but with margin somewhat reflexed. Antennae simple; II with spine and III rather disciform; arista with long curved hairs.

---

[1] Paper XIII was printed in these Notulae Naturae, no. 121, 4 pp., 1943.

[2] ὁπλο + αιγις = armed shield, referring to scutellum.

Mesonotum destitute of macrochaetae except posterior intra-alar, postalar; weak humeral and one (posterior) notopleural weak and well removed dorsad. Scutellum large, quadrate, with widely separated apical bristle-bearing tubercles. Abdomen long with tergites II to IV comprising about .8 of its length. Legs long, slender, destitute of strong setulation. Wings long, slender; vein II very long; no cleft definite in the costa at vein I, nor setae on costal section I. Alula linear without cilia.

Hoploaegis browni (Cresson)

1925. *Stratiothyrea browni* Cresson. Trans. Amer. Ent. Soc., LI, p. 240.

Described from Manila, Philippine Islands; type ♂ ?, [U.S.N.M.].

Atissa luteipes new species

Similar to *pygmaea* (Haliday) and the Nearctic *humulis* (Coquillett), but smaller; legs entirely yellow and the cheeks about one-half as broad as third antennal segment. Mesonotal setulae in four series between the intra-alars, and the costal section II slightly longer than III. Crossveins not clouded. Face about as broad as long rather sharply prominent at epistoma.

Length, .88 to 1. mm.

Type.—Female?; Puerto Castilla, Honduras; April 24, 1926; (R. H. Painter); [A.N.S.P., no. 6661].[3]

Paratypes.—2 ♂ ?; same data as for type but dated April 22 and 26, 1926.

Allotrichoma nitidum new species

A species unique in this genus by being shining black with very sparse brown dusting and no definite cinereous markings.

Black; pale, yellow to ferruginous, on the halteres knob, and tarsi. Wing veins dark.

Frons slightly grayish anteriorly, with opaque black frontalia; the narrow lunule cinereous. Face sparsely brown, lighter ventrad. Cheeks and postbucca more cinereous; clypeus shining. Antenna III cinereous dorsad. Humeri gray.

Frons quadrate; face slightly narrower. Facial foveae and carina definite but shallow; the two facials low; upper but slightly above line of buccal orbit. Arista with five hairs.

---

[3] The type of this species has been given to the Academy by its collector, Reginald H. Painter.

Mesonotal setulae difficult to see but are seriated. Tergite IV about as long as II and III together. Wings rather short; costal section II about twice to three times as long as III; vein II straight to costa.

Length, 1.5 mm.

Type.—Male?; Simbang, Huon Gulf, New Guinea; (Biro); 1899; [A. N. S. P., no. 6662].[4]

Paratype. — 1 ♂ ?; topotypical.

DIPHUIA[5] new genus

This genus is erected for the anomalous species here described, which is superficially so similar to those of *Ditrichophora* that it is likely to be placed therein on first acquaintance. Its general shining condition strongly contrasts with the opaque species of the Atissini, to which tribe the present genus evidently belongs, as is evident by the curved aristal hairs and dorsal position of the posterior notopleural. It appears to belong near *Allotrichoma.*

Genotype: *Diphuia anomala,* here described.

Eyes large with axis vertical, at most micropubescent. Occiput concaved; vertex sharp, concaved; postorbit not visible in profile. Frons convex, in profile conjoined vertically with face; ocellar tumor not prominent; posterior ocelli slightly removed from vertex; divergent postocellars at vertex; ocellars strong, slightly in advance of anterior ocellus; outer and inner verticals at vertex; frontals and frontorbitals strong, about aligned with anterior ocellus. Face convex in profile, with slight median tumorosity; series of two well-separated facials; fovae shallow with no definite carina; buccal strong; postbucca ample, its posterior margin rather sharp, almost marginated. Mouth moderately narrow; clypeus narrow, just visible. Antennae low, about at center-line of head and eyes; segment II with strong spine; III disciform; arista with long hairs curved at tips.

Mesonotal setulae numerous, not seriated. Macrochaetae present: humeral, presutural, postalar, posterior intra-alar; prescutellars well caudad, two notopleurals, the posterior one well removed dorsad; notopleura bare. Scutellum rather flat with four apicals, approximate; laterals basad. Abdomen strongly setulose, ovate; tergite IV as long as I to III; V very short; genital segment globose, well exposed.

Legs rather stout; fore femur without antero-flexor comb but with post-flexor cilia. Wings with costa not noticeably cleft at vein I and not setose on section I, but with rather even cilia; veins I to III strong, IV and V weaker; vein II long; III and IV slightly converging; crossveins well basad.

---

[4] Secured by purchase from The Hungarian National Museum.

[5] Διφυια = double nature.

Diphuia anomala new species

A very interesting species which in general appearance simulates *Discocerina nitida* Cresson, 1918, a member of another tribe, which also occurs in Panama. However, the present species has the characteristics of the tribe Atissini as noted under the genus.

I do not think this can be Hendel's *Discocerina* (*Lamproclasiopa*) *facialis*, 1933, described from Bolivia, which species is stated to lack the meso- and sternopleurals, and have the notopleura setose.

Pale; yellow to tawny on apices of tibiae, bases of tarsi, wing veins, and halteres. Wings immaculate, yellowish hyaline. Antennae entirely black. Shining to polished, with frons, mesonotum, scutellum and disc of abdomen, dusted with brown, generally only just enough to subdue the gloss. Face with a median spot, a facialia line and margin of epistoma, niveous to silvery. Pleura somewhat cinereous.
Head transverse, higher than long. Frons about .3 width of head, with distinct wrinkles at lower orbit, but areas not otherwise noticeably relieved. Face rather narrow, about .3 width of head, narrowest at upper facial, then strongly flaring to moderately broad cheeks which are about as wide as length of antenna III. Arista with five hairs.

Length, 1.6 mm.

Type.—Male; Monte Lirio, Panama; April 6, 1923; (R. C. Shannon); [U. S. National Museum].

Paratypes.—11 ♂, 5 ♀; with same data as for type.

PECTINIFER[6] new genus

Genotype: *Pectinifer aenea* (as *Discocerina aenea* Cresson, 1918).

The type species strangely suggests some of the Athyroglossae in its armed fore femur and general build. Although the three subequal facials strongly suggest association with the species of *Discocerina* s. str., the bare notopleura and the cephalad position of the anterior notopleural, places it nearer those of *Ditrichophora*.

Head subdisciform, about as broad as high, in profile much higher than long. Frons in profile, almost vertically conjoined with face; occiput concaved; vertex sharp, concaved; postocelli slightly removed from vertex, not on distinct tumor; ocellars stronger than postocellars, frontal and front-orbital equally strong, approximate, about aligned with ocellars. Face subgibbose medially and prominent in profile, concaved above, with weak foveae and carina; primary series of three subequal facials mesally inclined, on weak papillae; parafacies linear; epistomal margin slightly concaved, with prominent clypeus. Postbucca narrow, upper posterior orbits not visible in profile. Antennae as in *Discocerina*.

---

[6] *Pectinis* + *fer* = armor bearing, in allusion to the comb of the fore femur.

Mesonotum rather flat caudad; setulae weak, irregularly arranged; no prescutellars; supra-alar very weak, the strong intra-alar well caudad. Notopleura bare; anterior notopleural rather cephalad, not much nearer posterior one than to humeral. Scutellum acutely trigonal, with laterals well basad. Abdomen ovate.

Femora rather stout, the fore ones with distinct anterio-flexor comb of spinules. Wings as in *Discocerina*, with vein II straight.

Psilopa schildi new species

Similar to *Psilopa metatarsata* (Cresson, 1939), but the face is smoother polished, and the wings have a distinct apical infuscation. The facial structure, in many respects, resembles that of some of the species of the Gymnopini.

In general, shining to polished black; pale, yellow to orange: the antenna III except apex, apices of mid and hind tibiae and their tarsi except apices. Fore metatarsus white, the apical four segments of fore tarsi black. Halteres lemon yellow.

Frons and mesonotum more or less subopaque, either in its sculpture or vestiture: particularly is this so of the mesonotum where the brown dusting is more dense. Face, pleura and abdomen polished black. Wings slightly obscured, except for a large apical infuscation, most pronounced apicad in submarginal, distad of end of vein II, the density evanescing inferiorly but sharply delimited proximad in a slight arc from tip of vein II to about midway between tips of veins IV and V; a similar infuscation over posterior crossvein, suggesting the inferior extremity of a median band; marginal cell slightly infuscated.

Face nearly as broad as frons, entirely smooth, with evenly convex median gibbosity, which is very distinct in profile; upper facial about in line with or slightly ventral of buccal orbit. Superior spine of antenna II and the inferior seta about one-half as long as III; the latter longer than broad.

Length, 2.3 to 3 mm.

Type.—Male; La Suiza, Costa Rica; May 24, 1926; (Pablo Schild); [A.N.S.P., no. 6663].

Paratypes.—2 ♀; topotypical; IV, 1922, and V 6, 1926.

Discomyza dolichocerus new species

The elongate, *Ceropsilopa*-like antennae, is the outstanding characteristic of this species, and this may be a valid basis for a distinct genus. However, because of the general similarity of the species to the others of the genus, particularly to *africana*, and because of our comparatively slight knowledge of the taxonomic importance of these organs, I am not considering such treatment at this time. This deviation from the more typical species seems to be merely the elongation of the three antennal segments, and is not evident in any other morphological features. In *Ceropsilopa*, the second segment does not possess any distinct dorso-lateral suturation or lobation, which is present in this species and does not allow its assignment to that group. On the other hand, in the present species, the setation of the second segment is much reduced, with the mesal marginal seta more strongly developed than is usual in *Discomyza*, apparently at the expense of the usual spine, which in the present species is very short on one antenna and not evident on the other; also the erect dorsal seta is likewise irregular. This inconsistency deters me from considering it a member of a distinct genus.

Pale, yellowish to ocher: antenna II and III except apex of latter, mid and hind tarsi except apices. Fore metatarsus whitish as is also the knob of halteres. Wings brownish with dark veins; costal margin infuscated from mid marginal to vein IV, small cloud at tip of vein I, large cloud over posterior crossvein extending into first posterior.

Inconspicuous brown dusting on frons, thorax, scutellum and abdomen. The linear parafacies niveous. Generally subopaque to opaque as the result of the rugulose and granulose sculpturing, the mesofrons, parafrons, face and legs being more shining.

Similar in structure to *incurva* (Fallen). Setation more reduced. Head but slightly broader than high. Frons about .3 width of head, much broader than long with parallel orbits; areas differentiated as in *incurva*. Setation reduced (postocellars and proclinate frontals wanting in type). Face distinctly narrower than frons, at least twice as long as broad, in profile strongly convex submedianly; upper facials about aligned with buccal orbit; general sculpturing consisting of a weak but distinct linear median carina from margin of frons to epistoma, laterad of which are transverse irregular rugae or pits; parafacies linear, smooth. Cheeks in width .5 length of antenna III. Antennae very long, almost attaining line of buccal orbit; segment I distinctly visible, II pendant, inverted conical, with dorsal inconspicuous spine; III almost three times as long as II, about five times as long as broad; arista about as long as III, with seven hairs.

Mesonotum, abdomen and notopleura densely granulose. (Only the humeral bristle intact, the others possibly broken off.) Scutellum flat, appearing longer than broad, densely granulose and longitudinally rugulose (all bristles lacking). Abdomen elongate, flat, with sharp margin; tergites II to V almost equal in length.

Fore femur with about six antero-flexor spinules of which the three distals are much the longest. Wings longer than with *incurva;* vein II long, slightly curving into costa; costa II about 1.5 as long as III.

Length, 3.3 mm.

Type.—Male; Naivasha, Kenya Colony; July, 1937; (H. J. A. Turner); [British Museum of Natural History].

Hydrellia trichaeta new species

1925. *Hydrellia conformis* Johnson (in part), Occ. Pap. Boston Soc. Nat. Hist., VII, p. 271. (Error for *conformis* Loew).

1936. *Hydrellia conformis* Cresson (not Loew), Trans Amer. Ent. Soc., LXII, p. 261.

This is what Johnson and Cresson considered to be Loew's *conformis*, based on a misidentification by Dr. C. W. Johnson and my own incomplete comparison with the type of that species. A more recent examination of Loew's type proved *conformis* to be the male of his *valida*.

Pale: antenna III somewhat, palpi, fore coxae, tibiae wholly or in part, tarsi except apices. Halteres lemon yellow. Wings yellowish with pale veins.

Subopaque, grayish to brownish; frons, mesonotum, scutellum and abdomen becoming gray on humeri, notopleura and laterally on abdomen; frons and mesonotum overcast with grayish in some aspects; frontalia black in cephalic aspect. Face yellow or white, sericeous. Occiput ventrad, pleura, metanotum, and femora more or less cinereous.

Head slightly broader than high (about as 25: 20), almost as long as high. Frons transverse (as 14 : 25), about .5 width of head; frontorbitals about as strong as frontals; lunule small. Face about .25 width of head (as 6 : 25), nearly twice as long as broad (10 : 6), with five to six facials in series extending well above mid profile; parafacies linear to obsolete dorsad with minute down-curved hair. Cheeks as broad as antenna III. Arista with five to six hairs. Palpi with one or two setae.

Mesonotal setulae strong; six to eight acrostichal setulae in the series; antesutural dorsocentral nearly as strong as postsutural, and the latter situated well cephalad, and sometimes a second postsutural is present and well developed; prescutellar quad,[7] almost quadrate; humeral weak. Lateral scutellars well basad and almost as strong as apicals.

Abdominal setulae strong; apical margin of genital segment (tergite VI) slightly notched medially. Femora rather stout; anterior series of setae on mid femora well developed, occupying distal half; lateral setulae of tarsi rather appressed; setae of apical tarsus short, not overreaching pulvilli. Costa II longer than III (about as 2 : 3); vein II nearly straight.

Length, 1.8 to 2.2 mm.

Type.—Male; Redding; Connecticut; August 3, 1931; (A. L. Melander); [A.N.S.P., no. 6658].[8]

Paratypes.—2 ♀; Providence, Rhode Island; September 16 [Boston Soc. Nat. Hist.; *conformis* det. C. W. Johnson]. 1 ♀; Horseneck Beach, Massachusetts; August 10, 1896; (G. deN. Hough); [Boston Soc. Nat. Hist.].

---

[7] The rectangle formed by the two prescutellars and the caudal margin of the mesonotum.

[8] The type is retained by the Academy through the kindness of Dr. A. L. Melander.

Hydrellia unigena new species

This species belongs to the Cruralis Group and not distantly related to *H. victoria* Cresson, differing from the latter in its uniformly cinereous colored vestiture, and yellow tibiae. Unfortunately the species is represented only by the female sex.

Black; pale, yellow to tawny on the palpi, halteres, tibiae, and tarsi except apices. Wings with dark veins.

Opaque, entirely cinereous with ochraceous tint, except the abdominal dorsum medially and the small trigonal frontalia which are black; face and lunule yellowish, nearly white.

Eyes strongly elongate vertically; frons transverse with broad parafrontals and parallel orbits; lunule large. Face about .5 width of vertex, three times as long as broad, the orbits hardly diverging ventrad; in profile slightly convex ventrad; distinct parafacies grooves as continuation of the foveae; parafacies hardly perceptible; about five hair-like facials. Cheeks hardly as broad as antenna III. Antenna II with discernible spine; III hardly longer than broad; arista with four to five hairs.

Mesonotum sparingly setulose with well-developed antesutural dorsocentral, which is well in advance of the suture and the postsutural dorsocentral. Scutellum flat, bare. Wings long, with costa II distinctly longer than III.

Length, 2.3 mm.

Type.—Female; Parramatta, New South Wales, Australia; 1909; (Biro); [A.N.S.P., no. 6664].

Ochthera melanderi new species

Very similar to *humilis* Williston, of Central and South America, but averages larger and has a more grayish appearance; face seems narrower and longer. uniformly niveous. The abdomen in both sexes is entirely cinereous except the narrow apical margins of tergites III and IV of the male.

Black; orange to brown on the palpi, fore and mid femora, and tarsi proximally. Antennae and hind tarsi, black; halteres lemon yellow, squamae, white.

Mesofrons shining, more or less granularly sculptured, the broad orbits brown to grayish. Face including cheeks and postbucca, niveous or with yellow tone. Mesonotum somewhat shining, finely granulose and more or less bronzed; the three narrow median dark stripes, in some aspects, blue to cupreous; humeri, notopleura and the prescutellar region, cinereous. Scutellum concolorous with mesonotum, with some cinereous dusting. Oblique pleural stripe to metanotum; abdomen, femora and tibiae, rather densely cinereous. Abdomen of male more or less denuded and shining at lateral margins of tergites III to V; apical margins of III and IV shining to polished; of female, in some aspects, shining with metallic colors, particularly at lateral margins; an ill-defined dark median stripe also perceptible.

Head slightly broader than high (about as 45 to 40). Face scarcely .3 width of head (as 12 to 45); about twice as long as broad. The shining black, more or less lunate apical fasciae of tergites III and IV of the male, have series of setulae along their cephalic margins; tergite V of male distinctly longer than IV.

Otherwise similar to *humilis*.

Length, 5 mm.

Type.—Male; Riverside, California; October 7, 1934; (A. L. Melander); [A.N.S.P., no. 6665].[9]

Paratypes.—12 ♂, 6 ♀; topotypical with same data as for type. 3 ♀; Palm Springs, California; November 7, 1934. 3 ♂, 3 ♀; Palm Canyon, same date; (A. L. Melander).

---

[9] The type of this species has been placed in the Academy's collection by Dr. Melander.

NOTULAE NATURAE

NUMBER 136 OF JUNE 21, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON NAIDOMORPH OLIGOCHAETA OF PHILADELPHIA AND VICINITY

BY Y. CHEN
Chungking, China

With a view to securing some aquatic Oligochaeta of North America for comparative study with Asiatic forms, the writer took several collecting trips in Philadelphia, Pennsylvania, and neighboring places during his sojourn there. Early in the 1850's Leidy made a similar study. But since that time there has been no comprehensive publication on this group of animals of this region. The present study is by no means an exhaustive one, though the new material presented in it may throw additional light on the subject. The following account includes 24 species of which three are described as new and several others are new records for the continent of North America. The investigation was done partly in the Zoological Laboratory, University of Pennsylvania, Philadelphia, Pennsylvania, and partly in the Department of Biology, National Central University, China. The types are at present in the latter institution. To both institutions the writer expresses his sincere gratitude.[1]

AEOLOSOMATIDAE

1. **Aeolosoma hemprichii** Ehrenberg

In 1887, Cragin described as new *A. stokesii* from Kansas. His diagnosis, however, is too brief to be identifiable. Judging from its large size, salmon red " nuclei " and simple setae, it may be included in this species. Smith recorded it in Illinois. Philadelphia.

---

[1] The manuscript of this paper came by air-mail from Chungking, where Dr. Chen has been working since his flight from Nanking with the National Central University. The paper was written, therefore, under extreme war conditions, that is, while exposed to personal danger and severe privations and lacking the cultural facilities of large scientific centers. For reasons inherent in the present situation it has not been feasible to send proofs of the paper to Dr. Chen for his examination. (Ed.)

2. **Aeolosoma quaternarium** Ehrenberg

This species is similar to the preceding but smaller. The diagnostic feature is the possession of sigmoid setae, which occur on the venter from the 3rd segment posteriorly. Leidy's *A. venustum* is probably synonymous with this species since it also possesses spine-like setae and is small. Philadelphia.

3. **Aeolosoma tenebrum** Vejd

Leidy's *Chaetodemus panduratus* gen. et sp. n. (1852) is an unidentifiable species. It probably belongs to the present one on account of its possession of long sigmoid setae and its large size. Cragin's *A. leidyi* is also synonymous with the present one. It was described as having " pale olive-green nuclei ", short sigmoid spine-like setae and n = 7. Philadelphia.

4. **Aeolosoma variegatum** Vejd

This species has never been definitely identified from North America, though it is fairly frequent at Philadelphia.

NAIDIDAE

5. **Chaetogaster limnaei** K. Baer

It is always found in the pulmonate snail *Limnaea* but has never been reported as living in *Planorbis*, as it does in China. It differs from *C. bengalensis* chiefly in the greater number of setae in each bundle. Philadelphia

6. **Chaetogaster diaphanus** (Gruith.)

Taken at Philadelphia, Media and Chester, Pennsylvania; Millville and Hardingville, New Jersey.

7. **Chaetogaster diastrophus** (Gruith.)

Philadelphia.

8. **Chaetogaster langi** Bretscher

Philadelphia, Pennsylvania; Millville, New Jersey.

9. **Chaetogaster crystallus** (Gruith.)

This species has not been recorded previously in America. It is similar to the preceding but differs in the shorter oesophagus and the failure of its commissural blood vessels to extend on to the pharynx. Philadelphia.

10. **Amphichaeta americana** new species Figure 1

Description: Length of a single animal 1.5 mm. (about 3 mm. in life), width 0.18 mm. Segments of a single zooid 10. Prostomium a little produced, ciliated anteriorly. No eyes. Pharynx greatly elongate, extending to segment iv. Oesophagus short in segment iv, globular. No stomach. Intestine from 5th segment posteriorly. Segment iii greatly elongate, equal to length of two or three segments. Setae all forked, dorsal and ventral similar. Each almost straight, very slightly curved toward distal end, about 63 μ long, 3 μ thick, nodulus weak, proximal (38 : 24 = distal; proximal parts). Those on first two segments similarly forked, distal prong a little longer, their ratio of length being 4 : 3 μ; those on other segments with the distal prong nearly three times as long. Ventral setae 2-4 per bundle on ii & iii, 3-5 (mostly 4) on other segments. Dorsal bundle on iii 3 or 4 which are interposed between the 2nd and 3rd segments; 3-4 on other segments.

Living specimens transparent, darker along gut. No coelomic corpuscles. Nephridia not observed. Millville, New Jersey.

Remarks: Only two or three specimens were obtained from Union Lake, Millville, New Jersey. In an attempt to increase the number by rearing, several individuals were obtained. Unfortunately most of them died in the culture. However, some notes were taken from the live specimens. Only one specimen was saved for closer observation after staining and mounting. Sexually mature ones were not found. This peculiar genus was known only in Europe where two species were recorded. So far as I am aware there is no other record in the New World. The new species is similar to the type of *A. sannio* in the general body form and parts of the alimentary canal, but differs in the larger size, fewer segments, straighter setae with unequal prongs and greater number in each bundle. The worms behave just like *Pristina* and were found in a fresh-water lake about 15 miles from the coast.

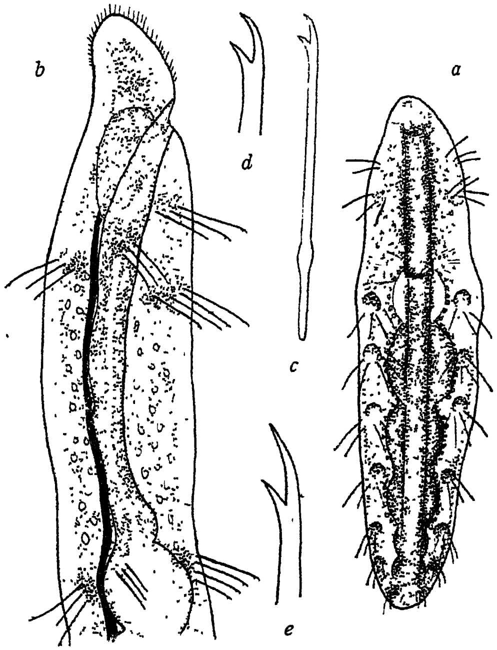


Fig. 1. *Amphichaeta americana* sp. nov. *a*, entire worm, ventral view; *b*, anterior, lateral view; *c*, *d*, seta on ii, and its distal portion enlarged; *e*, distal portion of seta on middle of body.

11. **Pristina leidyi** Smith

The present species is almost identical with *P. longiseta* and therefore was regarded by Michaelsen as a variety (*P. longiseta* var. *leidyi*). But the serrations on the convex border of the capillary setae are strikingly different. It was re-estimated and raised to its proper rank (*vid.* Chen '40). Philadelphia; Hardingville, New Jersey.

12. **Pristina schmiederi** new species[2] Figure 2

Description: Length of a chain 3.5-4.8 mm. (preserved); width 0.17-0.24 mm. Segments up to 50, *n* = 16-18 (oftener 17 or 18). Length of a single animal. 2.5 mm., posterior end (*ca.* 0.1 mm.) undifferentiated, devoid of setae. Prostomium produced to form a proboscis 0.12-0.25 mm. long. No eyes. No stomach. Intestine swelling in viii, often more widely dilated from 10th segment backward. Dark coelomic corpuscles numerous behind 6th segment. Ventral setae of anterior segments similar in shape to those following, on anterior and middle body 5-7 per bundle, nodulus slightly distal to middle, 48-60 μ long, 1.8 μ in diameter, prongs about equally long, distal one thinner, slightly curved at free end. Dorsal setae bundles consisting of 2 or 3 hairs and usually 2 needles, hairs about equally long, perfectly smooth, shorter on segments ii-vi (85-280 μ), especially so on ii & iii, gradually elongated up to 6th segment, longest ones about 450 μ: shorter also on posterior segments. Needles 48 μ long, without nodulus, nearly straight, each with two very minute prongs, about equally long, more or less straight. Budding zone distinct with six intercalated setigerous segments. Setae on anterior segments of new zooid shorter but similar to those following. Hardingville, New Jersey.

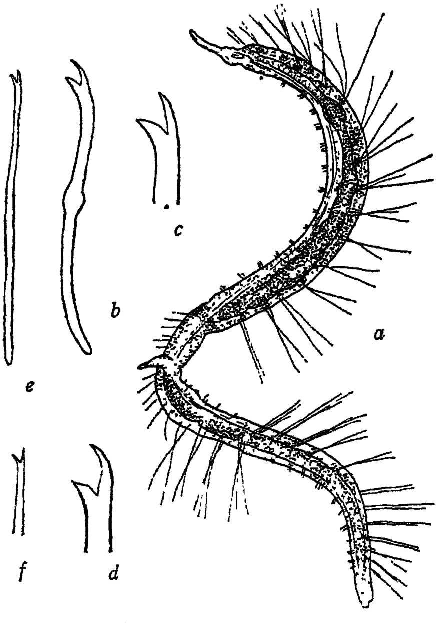


Fig. 2. *Pristina schmiederi* sp. nov. *a*, entire worm; *b*, *c*, anterior ventral seta and its distal portion enlarged; *d*, posterior ventral seta; *e*, *f*, dorsal needle and its distal portion enlarged.

---

[2] Named after Dr. R. G. Schmieder, with whose cooperation the specimens from New Jersey were made available.

Remarks: This new species is unique in its large size, long and smooth hairs and bifid dorsal needles. It is distinguished from all the known species of the genus. Sexually mature ones have not been found in the collection, though specimens are quite numerous.

13. **Nais communis** Piguet

By the character of fine prongs of the dorsal needles and other characters in comparison with the Oriental form, the writer identified with certainty the American form of this species. They are perfectly identical. Philadelphia.

14. **Nais elinguis** O. F. Müller

Philadelphia.

15. **Naidium breviseta** Bourne

This species is mainly confined to the Oriental region and occasionally is found in Europe. It is now for the first time recorded in North America. The form as obtained from a small pond at Gloucester, New Jersey., is perfectly identical with Oriental material. It is also large and possesses a stumpy proboscis which is specially noticeable in the second zooid. Gloucester, New Jersey.

16. **Naidium bilongata** new species Figure 3

Description: Length of body 6-8.5 mm. (up to 25 mm. in life), 0.22-0.35 mm. in width, segments of 40-65, plus an undifferentiated portion (*ca.* 0.7-0.9 mm. long), devoid of setae. Prostomium rounded and broad at base. No eyes. Stomach begining in segment vii. Intestine gradually dilated from viii posteriorly. Ventral setae all forked, no difference in anterior and posterior parts of body, about 6-10 (8 or 9 commoner) per bundle at anterior and middle, 4-6 at posterior part of body, gradually reducing toward undifferentiated end; about 84 μ long, 3.5 μ wide, nodulus slightly distal to middle, distal prong slightly longer and thinner at anterior, markedly thinner and shorter at posterior body. Dorsal setae consisting of 2 hairs and 2 needles, first bundle on 3rd segment, slightly in front of 2nd ventral bundles with 2 (occasionally 4) very long hairs, 1130-1200 μ; those on 6th equally long, or longer, on 5th and posteriorly abruptly shortened, about half length of longest ones (525-700 μ), without serration; dorsal needles 2 (occasionally 3) per bundle, a little curved distally, no nodulus, with the distal prong straighter and slightly thinner. Budding zone not well-marked. Only in one specimen, slightly constricted behind 14th segment. Budding probably taking place by fragmentation and head region of four segments possibly regenerated. First three ventral and two dorsal bundles of setae shorter in some specimens, probably regenerated after separation. $n = 13\text{-}15$. Color brownish or reddish (on account of blood vessels), dark spots in front of first bundles of dorsal setae connected dorsomedially. Another small patch on dorso-median side of prostomium. Coelomic corpuscles numerous in all specimens. Hardingville, New Jersey.

Remarks: The new species is characterized by having first dorsal bundles of setae on the 3rd segment instead of 2nd, the hairs of the first two dorsal bundles especially long, and the peculiarities of the budding zone. The sexual organs have not been observed.

17. Stylaria fossularis Leidy

The present species, with proboscis projecting from the apex of the prostomium, is clearly distinct from the following species which has its proboscis inserted in a notch. It is distributed in Asia and also in North America. For a discussion of the nomenclature of these two species, reference should be made to Chen '40. Philadelphia.

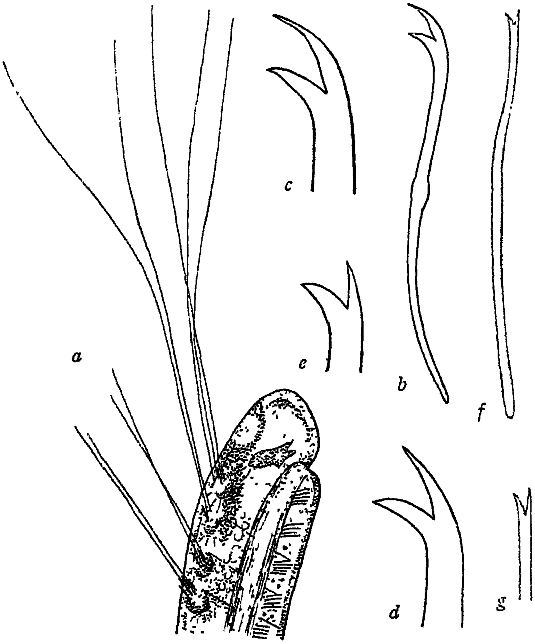


Fig. 3. *Naidium bilongata* sp. nov. *a*, anterior end of the worm; *b*, *c*, anterior ventral seta and its distal portion enlarged; *d*, *e*, middle and posterior ventral setae; *f*, *g*, dorsal needle and its distal portion enlarged.

18. Stylaria proboscidea (Müll.)

Syn. *Stylaria lacustris* (Linné).

Philadelphia, Pennsylvania; Hardingville, New Jersey.

19. Slavina appendiculata (Udek.)

This species is quite frequent in North America. Smith reported its occurrence in Illinois. It is identical with the form distributed in the Eurasian region. In 1850 Leidy described a new species *Nais gracilis* (=*Slavina gracilis* according to Michaelsen) from this locality, and the question of its identity with the present species is raised. His description fits very well into this species in several important respects, but he failed to observe the non-retractile papillae which usually entangle particles of plants, and said of his specimens " whitish " instead of brownish as usually appears. Five years later Jule d'Udekem in Belgium described it as *Nais appendiculata* because the body was covered with " appendices ". Since there is no other form of the genus reported in this locality or other parts of North America, Leidy's species should be held in doubt. It was said to be " found among algae in fresh-water rivulets ". I would assume that his specimens, not bottom-dwellers, were probably invested with little particles and therefore appeared " whitish ". The integumental papillae which are very inconspicuous might easily be overlooked. Since there is no conclusive evidence which will be in favor of its priority, my statement may serve as a lead for future work. Philadelphia and Chester, Pennsylvania; Millville, New Jersey.

20. **Dero limosa** Leidy

Philadelphia, Pennsylvania; Hardingville, New Jersey.

21. **Dero obtusa** Udek

Philadelphia.

22. **Dero perrieri** Bousf.

It resembles closely *Aulophorus furcatus* except there are not two " palps " at the posterior margin of the branchial fossa. The latter when expanded is much broader than the body diameter, whereas in *D. obtusa* it is nearly the same width. It is frequent in this region but has never before been reported. Philadelphia.

23. **Aulophorus furcatus** (Oken)

Philadelphia.

24. **Aulophorus vagus** Leidy

This species is fairly common in clean waters either creeping upon the weeds or floating on the water surface. It usually constructs and lives in a portable case. Two long cylindrical " palps " are found on the ventral edge of the branchial fossa. From the margin of the latter three pairs of flat, semilunar gills project. Bousfield apparently made an error in combining this with *A. furcatus*, which is clearly distinguishable. It is probably identical with Schmarda's *Aulophorus discocephalus* from Jamaica, described in 1861, nearly two decades earlier than Leidy's description was made known. In his figure, he showed the dorsal hairs and two posterior "palps" but not the gills. His description is inadequate for reliable identification. *A. vagus* should therefore stand for this American species. Philadelphia.

BIBLIOGRAPHY

CHEN, Y. Contributions Biol. Lab., Sci. Soc. China. Zool. ser. Vol. 13, no. 10. 1940. Also in Contributions Zool. Lab., Univ. of Penna., Phila., Pa. Vol. 39, no. 11. 1941.

CRAGIN, F. W. Bull. Washburn College Lab., ii (8). 1887.

LEIDY, J. Proc. Acad. Nat. Sci., Phila. 1850.

————. Journ. Acad. Nat. Sci., Phila., ii (1). 1850.

————. Proc. Acad Nat. Sci. Vol. v. 1852.

————. Amer. Nat. Vol. 14. 1880.

MICHAELSEN, W Oligochaeta in: Das Tierreich Lief. 10. Berlin, 1900.

SMITH, FRANK. Bull. Ill. State Lab. Nat. Hist. Vol v. 1900.

WALTON, L B. Amer. Nat. Vol. 40, no. 478. 1906

NOTULAE NATURAE

NUMBER 137 OF JUNE 21, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

SOUTH AFRICAN BIRD-LOCUST RECORDS AND NOTES (ORTHOPTERA; ACRIDIDAE; CYRTACANTHACRIDINAE; GROUP CYRTACANTHACRES)

BY JAMES A. G. REHN
Curator, Department of Insects, Academy of Natural Sciences of Philadelphia

Included in extensive series of Orthoptera from a considerable number of African areas now in the course of study, are many representatives of the bird-locusts, that group of large and often striking forms which embraces a number of very great economic importance. As the completion of the full reports on these comprehensive collections is a matter of the future, it seems desirable at this time to place on record the information supplied by the South African material of the bird-locusts already determined.

Fourteen species of eight genera are covered by the present notes, of which two species or subspecies were found to be new, and already have been described in Academy publications. Forty-six individual localities are represented by the material here listed, the range of one genus and species is extended materially beyond its previously known geographic limits, the first exact records from considerable areas are given for two species, structural individual variation is pointed out in three species, and in one case may indicate an unrecognized geographic race, and individual or regional color variation is noted in six species or subspecies of five genera. In addition much detailed data on distribution and seasonal occurrence are here made available.

The material reported is chiefly from the collections of the Academy, those of the Transvaal Museum, and of the University of Pretoria. The author wishes to thank the authorities of the two latter institutions for the opportunity to examine this and other material from their collections, and for permission to retain, in return for identifications, the usual allowance of specimens for the Academy series. The abbreviations used for the names of the respective institutions are sufficiently ample for their meaning to be obvious.

ACRIDODERES Bolívar

Acridoderes crassus I. Bolívar

1889. *Acridoderes crassus* I. Bolívar, Jorn. Sci. Math. Phys. e Nat., Lisboa, (2) I, p. 163. [♂, ♀; Caconda and Quango, Angola.]

ANGOLA: Palavange[1]; XI, 2, 1930; (Second Prentiss Gray Afr. Exped.; H. T. Green); 1 ♀; [A.N.S.P.].

While somewhat smaller than Bolívar's original measurements, and with its body colors partly altered by desiccation, this individual otherwise fully agrees with the original description, except that there is no indication of oblique fuscous fasciae distad on the tegmina. Probably the presence, or at least emphasis, of these markings is an individual feature.

The distribution of this species is now known to extend eastward to Mashonaland (Salisbury), Southern Rhodesia, and south to Okovango, Southwest Africa.

ANACRIDODERES Uvarov

Anacridoderes laevigatus (I. Bolívar)

1911. *Acridoderes laevigatus* I. Bolívar, Ann. Soc. Entom. Belg., LV, p. 303. [♀; Katanga, Belgian Congo.]

TRANSVAAL: Pretoria; IV, 19, 1909; (L. Gunning); 4 ♀; [Transv. Mus. and A.N.S.P.].

CAPE PROVINCE: Rietfont[ein], Richmond District; IX, 14, 1904; 1 ♂; [A.N.S.P.]. Rhen[oster] Kop, Venterstad District; XII, 17, 1906; 1 ♂, 1 ♀; [Transv. Mus.].

These specimens fully agree in all important respects with Bolívar's original description. Uvarov has already recorded the species[2] from Pretoria and Johannesburg, Transvaal, but the above Cape Province records carry the known range of the species, and incidentally of the genus, appreciably to the southward.

Representative specimens measure (in millimeters) as follows:

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur
♂, Reitfontein	36.5	9.3	31.6	19.4
♂, Rhenoster Kop	28.4	8.6	29.8	18.2
♀, Rhenoster Kop	46.3	11.2	37.3	22
♀, Pretoria	43	13	44	26.4
♀, Pretoria	44.5	11.4	38.4	23.6

---

[1] Palavange is located between the Cuanza and Luanda Rivers, about seventy miles north of Silva Porto, at an elevation of 4500 feet.

[2] Ann. and Mag. Nat. Hist., (9) XI, p. 477, (1923).

RHYTIDACRIS Uvarov

Rhytidacris punctata (Kirby)

1902. *Acridoderes punctatus* Kirby, Trans. Entom. Soc. London, 1902, p. 239. [♂ (not ♀); Rustenberg. Transvaal.]

Transvaal: Shilouvane, Letaba District; XI, 1899; (Rev. Junod); 1 ♀; [Transv. Mus.]. Lydenburg District; 1896; (P. A. Krantz); 1 ♂; [Transv. Mus.]. Barberton; IV, 1905; (Miss de Beer); 1 ♂; [A.N.S.P.]. No exact locality; 3 ♀; [Transv. Mus. and A.N.S.P.].

This small series shows the species varies appreciably in the degree of subbullation of the dorsum of the pronotal prozona in the female, and also in the degree of emphasis of the dark general color pattern. The former variation is evident in both the dorsal aspect and in profile, the more nearly bullate type (represented by the three females without exact locality) having the profile of the median carina of the prozona slightly more arcuate than in the Shilouvane female. The future may show there is a regional correlation of this variation, but present series are too limited and with much too meager data to permit any deductions.

In coloration the Barberton male, the female from Shilouvane and one of those without exact locality have the fuscous maculate pattern quite evident, much as originally, but not very carefully, described by Kirby. The Lydenburg male and the other two females have the infuscate pattern definitely more recessive and less evident, although traceable. The ground color is more reddish in the Lydenburg male and in one female without exact locality than in the others, with the fuscous pattern weakly contrasted. The transverse fuscous bars on the dorsal surface of the caudal femora vary in emphasis with the tonal depth of the other elements of the fuscous pattern.

When *R. punctata* is compared with the genotypic West African *R. tectifera* (Karsch),[3] the latter[4] is seen to be a larger and heavier species, readily separated by the detailed features given by Uvarov.[5]

ANACRIDIUM Uvarov

Anacridium moestum moestum (Serville)

1839. *Acridium moestum* Serville, Hist. Nat. Ins., Orth., p. 654. [♂, ♀; "Pays de Massilikats" [= present day Matabeleland, Southern Rhodesia].]

Southwest Africa: Greater Spitzkopje, near Usakos, Damaraland; VI, 30 – VII, 2, 1930; (De Schauensee Afr. Exped.); 2 ♀; [A.N.S.P.].

---

[3] *Cyrtacanthacris tectiferus* Karsch, Stett. Entom. Zeit., LVII, p. 299, fig. 24, (1896). [♀; Misahöhe, Togo, West Africa.]

[4] Bitje, Ja River, Cameroons; IV–VI, 1910; (Bates); 2 ♀; [A.N.S.P.].

[5] Ann. and Mag. Nat. Hist., (9) XI, p. 483, (1923).

BECHUANALAND: Gobabis to Ghanzi; VII, 21-24, 1930; (De Schauensee Afr. Exped.); 1 ♂; [A.N.S.P.]. Ghanzi to Lake N'gami; VII, 29-30, 1930; (De Schauensee Afr. Exped.); 1 ♂; [A.N.S.P.]. Kuke Pan; III, 21-30, 1930; (Vernay-Lang Kalahari Exped.); 1 ♀; [Transv. Mus.]. Gemsbok Pan; IV, 23 - V, 5, 1930; (Vernay-Lang Kalahari Exped.); 3 ♂, 6 ♀; [Transv. Mus. and A.N.S.P.]. Gomodimo Pan; IV, 1-5, 1930; (Vernay-Lang Kalahari Exped.); 1 ♂, 1 ♀; [Transv. Mus.]. Kaotwe Pan; IV, 8-12, 1930; (Vernay-Lang Kalahari Exped.); 5 ♀; [Transv. Mus. and A.N.S.P.]. Damara Pan; IV, 15-21, 1930; (Vernay-Lang Kalahari Exped.); 2 ♀; [Transv. Mus.].

TRANSVAAL: Zoutpansberg, Zoutpansberg District; XI, 15-30, 1932; (G. Van Son); 2 ♂; [Transv. Mus.]. Waterberg District; 1898-1899; (v. Jutrzencka); 1 ♀; [Transv. Mus.].

ZULULAND: St. Lucia Lake; X, 1931; (H. W. B.-M.); 1 ♂; [Transv. Mus.].

CAPE PROVINCE: Heuningvlei, Vryburg District; IV, 19, 1934; 1 ♂, 2 ♀; [Univ. of Pretoria]. Boetsap, Barkly West District; V, 3, 1918; 1 ♀; [Univ. of Pretoria]. Victoria West, Victoria West District; VI, 14, 1939; (R. H. N. Smithers); 1 ♂; [A.N.S.P.].

Uvarov[6] has analyzed the two subspecies of *A. moestum*, and placed as a synonym of *A. m. moestum* Sjöstedt's *Orthacanthacris eximia*[7], which was erected upon a single female from Accra, Gold Coast. A female from Yapi, northern territory of the Gold Coast, determined as *m. moestum* by Uvarov, and received in exchange from the British Museum (Natural History) is inseparable from the above fair series from southern Africa. Curiously enough in listing the types of Acrididae in the collection of the Stockholm Museum, Sjöstedt, by a lapsus calami, gives[8] the original locality of the unique type of his *eximia* as Madagascar. His original description specifically gives Accra as the locality, and as far as known no member of the genus *Anacridium* occurs in Madagascar.

The St. Lucia male is interesting in having the most extensive fuscous band I have seen in any South African specimen, this leaving as broad a hyaline margin as usual, but encompassing the much restricted disk, which is tinted with violaceous. The Kalahari series shows an approximately uniform development of the fuscous band, which leaves a well marked and slightly yellowish tinted disk in all of them.

---

[6] Ann. and Mag. Nat. Hist., (9) XI, pp. 486-488, (1923).

[7] Arkiv för Zoologi, XII, no. 1, p. 2, fig. 2, (1918).

[8] Arkiv för Zoologie, 24A, no. 1, p. 37, (1932).

The females from Kaotwe Pan average smaller than those of the same sex from the other localities. Similarly the coloration of their heads and pronota is paler and more uniform, with at most but few of the usual blackish maculations found in these areas in other females. The antennae, however, are as solidly blackish as in other material of the form.

Karny, Sjostedt and Uvarov have recorded *A. moestum moestum* from a number of localities in Southwest Africa, and Karny has reported it from certain Kalahari localities, but capture dates usually have not been given. The Victoria West male, above recorded, has already been figured by me.[9]

Anacridium incisum Rehn

1942. *Anacridium incisum* Rehn, Notulae Naturae, no. 110, p. 1, figs. 1-4, 9. [♂ (type), ♀; Kasouga, Bathurst District, Cape Province, Union of South Africa.]

This very striking and quite distinct type may be found to be broadly distributed over eastern Cape Province. Only the type and allotype are known as yet.

NOMADACRIS Uvarov

Nomadacris septemfasciata (Serville)

1839. *Acridium septemfasciatum* Serville, Hist. Nat. Ins. Orth., p. 661. [♀; Cape of Good Hope.]

BECHUANALAND: Tsotsorogo Pan; VI, 17 – VII, 9, 1930; (Vernay-Lang Kalahari Exped.); 1 ♂; [Transv. Mus.].

TRANSVAAL: Shilouvane, Letaba District; V, 1901; (Rev. Junod); 1 ♀; [A.N.S.P.]. Waterv[aal], Standerton District; IV, 13, 1900; 1 ♀; [Transv. Mus.]. Pretoria; XI, 1894; (W. L. D[istant]); 1 ♀; [Albany Mus.].

NATAL: Durban; IX, 3, 1907; (G. F. Leigh); 1 ♂; [Transv. Mus.].

Of these specimens the male from Tsotsorogo Pan and the female from Shilouvane represent the solitary phase (*coangustata* Lucas), while the others are typical of the swarming phase[10] of this destructive species, which as the Red Locust is widely known throughout southern Africa.

I have also examined material of the swarming phase from "Natal"; Windhoek, Southwest Africa; Benguella, Angola, and Villa Bocage, Portuguese East Africa, and a specimen of the solitary phase from Mauritius, all in the collection of the Academy, or the Hebard Collection there located.

---

[9] Notulae Naturae, no. 110, figs. 5-8, 10, (1942).

[10] See Uvarov, Ann. and Mag. Nat. Hist., (9) XI, pp. 7-8, (1923); also Uvarov, "Locusts and Grasshoppers", pp. 278-279, fig 92, (1928).

ORNITHACRIS Uvarov

I have recently studied and figured all the forms of this genus.[11] The interested student is referred to my paper for South African records and full discussion of *O. orientalis* (Sjöstedt), *O. pictula pictula* (Walker), *O. pictula magnifica* (I. Bolívar) and *O. pictula cruenta* Rehn.

ACANTHACRIS Uvarov

Acanthacris ruficornis lineata (Stoll)

1813. [*Gryllus* (*Locusta*)] *lineatus* Stoll, Natuurl. Afbeeld Beschr. Spooken, etc., p 31, pl. XVb, fig. 57, Register p. 13. [♀; no locality given.]

Natal: Pinetown; III, 4 and V, 10, 1909; (G. F. Leigh); 2 ♂; [A. N. S. P.].

Cape Province: Constantia Nek, Cape Town; III, 10, 1939; (E. R. Helwig); 1 ♂, 4 ♀; [A.N.S.P.]. Hout Bay, Cape District; III, 5 and IV, 11, 1939; (E. R. Helwig); 3 ♂, 2 ♀; [A.N.S.P.]. Somerset West, Stellenbosch District; III, 2, 1939; (E. R. Helwig); 2 ♂; [A.N.S.P.]. Seven Weeks Poort, Prince Albert District; III, 21, 1939; (E. R. Helwig); 1 ♂; [A. N. S. P.]. Victoria West, Victoria West District; VI, 14, 1939; (R. H. N. Smithers); 1 ♂; [A.N.S.P.].

Uvarov's study of the subspecies of *Acanthacris ruficornis*[12] leaves much to be desired, chiefly through its failure to present evidence on the intergradation of the four forms discussed. One can only assume in what areas the forms are supposed to intergrade, and take at their face value the color characters given in the key for the recognition of the subspecies. It is very evident, after handling any considerable series of the species, that these features are much less diagnostic than would be assumed from Uvarov's paper. It is equally evident that areally the color of the caudal tibiae may depart from the standard there laid down, and the presence or absence of a dark fascia ventrad on the lateral lobes of the pronotum apparently is not an invariable feature to separate *A. r. lineata* from *A. r. fulva.* There is also definite individual variation as to whether these faciae are limited to the prozona of the lobes or extend over the metazona as well. I feel the future will show that these two forms have certain more constant differences than those used by Uvarov, but before making any more definite suggestions along these lines I wish to analyze extensive East and Central African series of the species yet awaiting study.

---

[11] Proc. Acad. Nat. Sci. Phila., XCV, pp. 111-137, pls. 13-18, (1943).

[12] Ann. and Mag. Nat. Hist., (9) XIII, pp. 14-19, (1924).

One male in the Hout Bay lot has the usual dark blotch ventrad on the lateral lobes of the pronotum subobsolete, although this is marked in all the others from that locality; the caudal tibiae are definitely bicolored in all from Hout Bay, the dark extensor portion blue-black. One Constantia Nek female also has the dark marking on the lateral lobes of the pronotum subobsolete, while in the others from that point it is well marked. The caudal tibiae in the Constantia Nek females are definitely bicolored, but the paler flexor section varies in shade from pale reddish to gamboge yellow. The two Somerset West males have definitely marked lateral lobes and the darker part of the caudal tibiae is blue-black, while the paler section is dull gamboge or pinkish red. The Victoria West individual is like that from Somerset West with pinkish red on the caudal tibiae, while the Seven Weeks Poort male differs in the darker part of these tibiae being dull purplish. The two Durban males have very marked dark areas ventrad on the prozona of the lateral lobes of the pronotum, while the caudal tibiae in one are dull lilac purple and dull ocher, in the other deep bluish purple and gamboge. The two Hout Bay females show considerable size difference for specimens of the same sex from a single locality. Their dimensions are: length of body, 53, 56.5 mm.; length of pronotum, 12, 13.5; greatest width of pronotal disk, 8.1, 9; length of tegmen, 49, 53.5; length of caudal femur, 30, 31.5.

Uvarov gave for this subspecies no locality east of Port Elizabeth, Cape Province, where he said " it meets with subsp. *fulva*." The Pinetown, Natal specimens here reported certainly cannot be distinguished from Cape Town individuals of *A. r. lineata*, yet differ from others from Pinetown and Durban in their maculate lateral lobes of the pronotum. The immaculate individuals I am here referring to *A. r. fulva*. It is more than probable we shall find there is in southeastern Africa a considerable area in which instability in this feature is prevalent. For comparison with Uvarov's determination of the present form I have used a pair from Namaqualand, determined by him as *A. r. lineata*, and received in exchange from the British Museum (Natural History). This latter material, I may mention, differs individually in the caudal extent of the fuscous maculation on the pronotal lateral lobes.

Acanthacris ruficornis fulva (Sjöstedt)

1909. *Acridium* (*Cyrtacanthacris*) *fulvum* Sjöstedt, Wissensch. Ergebn. Schwed. Zool. Exped. Kilimandj. Meru, 17, Orth. 7 (Acridioidea), pp. 184, 187, pl. 7, fig. 11. [♂; Kibonoto, Kilimanjaro, East Africa.]

SOUTHWEST AFRICA: Greater Spitzkopje, near Usakos, Damaraland; VI, 30–VII, 2, 1930; (De Schauensee African Exped.); 1 ♀; [A.N.S.P.]. Namutoni District, Damaraland; VII, 9-11, 1930; (De Schauensee African Exped.); 1 immat. ♀; [A.N.S.P.].

BECHUANALAND Gemsbok Pan; IV, 23–V, 5, 1930; (Vernay-Lang Kalahari Exped.); 1 ♀; [Transv. Mus.].

TRANSVAAL: Pretoria; III, 16, 1906; 1 ♀; [Transv. Mus.]: VI, 7, 1907; (Dr. Gough); 1 ♀; [Transv. Mus.]: VIII, 1901; (C. Swierstra); 1 ♀; [Transv. Mus.]: XI, 8, 1909; (Dr. Gunning); 1 ♀; [Transv. Mus.]: III, 10 and 16; 2 ♀; [Univ. of Pretoria]: IV, 3 and 5, 1930; 3 ♀; [Univ. of Pretoria]: VI, 16, 1915; 1 ♂, 1 ♀; [Univ. of Pretoria]. Rustenburg District; 1903; (P. Krantz); 1 ♂, 1 ♀; [Transv. Mus.]. Waterberg District, 1898-99; (v. Jutrzencka); 1 ♂, 3 ♀; [Transv. Mus. and A.N.S.P.]. Potchefstroom; IX, 11, 1910; 1 ♀; [Transv. Mus.].

NATAL: Durban; IV, 8, 1909, X, 8, 1906; (G. F. Leigh); 2 ♂; [A. N. S. P. and Transv. Mus.]. Pinetown; III, 20, 1909; (G. F. Leigh); 1 ♂; [A. N. S. P.]. Hilton Road; XII, 23, 1909; (G. F. Leigh); 1 ♀; [A.N.S.P.].

The Greater Spitzkopje and the Gemsbok Pan females have the base color very pale yellowish, with the lateral lobes of the pronotum entirely lacking any fuscous bar, but the mummy brown infuscate area of the dorsum of the pronotum and the dark tegminal maculae are pronounced and in consequence strongly contrasted, while the caudal tibiae are pale to dull lavender.

The Pretoria females alone vary greatly in their paler base color tone, which ranges through gray-brown, wood brown, dull reddish to yellowish ochraceous. The velvety infuscation of the pronotal dorsum also varies in tone in the Pretoria females from fuscous-black to umber, this not always correlated with the emphasis or depth of the dark tegminal pattern. The complete, or nearly complete, oblique bars on the tegmina vary individually in extent and emphasis, although they are approximately fixed in position. The caudal tibiae in the Pretoria specimens are usually, but not invariably, slightly paler on the flexor than on the extensor surfaces, with the darker color ranging from a pale lead blue through lavender to a deep lead blue. Of the Waterberg District females two as a whole are definitely washed with pinkish, thus resembling certain Pretoria specimens, while the other female, like the male, is wood brown in tone. In none of the various Transvaal individuals is the color of the caudal tibiae deep blue-black, instead usually some tone of lead gray or lead blue. The color of the caudal tibiae averages darker in the Natal specimens, although the female from

Hilton Road has them lead gray, much as in Transvaal specimens. Thus interior specimens average paler in the coloration of the caudal tibiae than coastal Natal representatives, which latter in this respect more nearly resemble Cape Province individuals of *A. r. lineata*.

Uvarov in 1924[13] reported this subspecies from Port Elizabeth, Barkly West, Knysna and Port St. John in Cape Province; Durban, Natal; Bloemfontein and Baviaan Krantz, Orange Free State; and Pretoria, Rustenburg and Fwambo, Transvaal. Karny in 1910 reported it as *ruficornis* from Windhoek, Okahandja, Otsosondu, Outjo and Kung-Bushmanland, Southwest Africa, and Moocane, Kova, between Kova and Severelela and Kakhea and Severelela in the Kalahari; while Sjöstedt in 1932 recorded it as *A. r. fulva* from Klein Karas in Southwest Africa. This subspecies has been reported by Uvarov from as far north as Kampala, Uganda and Mt. Elgon and Nakuru, Kenya Colony.

CYRTACANTHACRIS Walker

Cyrtacanthacris tatarica (Linnaeus)

1758. [*Gryllus* (*Locusta*)] *tatarica* Linnaeus, Syst. Nat., X ed., p. 432. [Tataria]

SOUTHWEST AFRICA: Windhoek; 1 ♀; [M. C. Z.]. Warmbad; 1 ♂; [Transv. Mus.].

BECHUANALAND: Gemsbok Pan; IV, 23–V, 5, 1930; (Vernay-Lang Kalahari Exped.); 1 ♀; [Transv. Mus.]. Gomodimo Pan; IV, 1-5, 1930; (Vernay-Lang Kalahari Exped.); 2 ♀; [Transv. Mus.]. Kaotwe Pan; IV, 8-12, 1930; (Vernay-Lang Kalahari Exped.); 2 ♀; [Transv. Mus. and A. N. S. P.].

TRANSVAAL: Zebedela, Potgietersrust District; III, 23, 1900; 1 ♀; [Transv. Mus.].

PORTUGUESE EAST AFRICA: Lourenço Marques; V, 22, 1939; (E. R. Helwig); 1 ♂; [A.N.S.P.]. Chai Chai[14]; VII, 1930; (J. C. Faure); 1 ♀; [Univ. of Pretoria].

ZULULAND: Conjeni; III, 22, 1927; 1 ♂, 1 ♀; [Univ. of Pretoria].

CAPE PROVINCE: Knysna; IV, 5, 1939; (E. R. Helwig); 1 ♂; [A.N.S.P.].

While this species is widely distributed over eastern and southern Africa, as well as much of southern Asia, the literature contains but a limited number of exact records of its occurrence in the Cape Province and areas to the northeast. While there are in the literature a number of records from

---

[13] Ann. and Mag. Nat. Hist., (9) XIII, p. 17, (1924).

[14] This is now known officially as Vila João Belo, and is situated on the Limpopo River a short distance above its mouth.

Southwest Africa, the above from Bechuanaland are apparently the first specific ones of its presence in the Kalahari.

Cyrtacanthacris aeruginosa aeruginosa (Stoll)

1813. [*Gryllus (Locusta)*] *aeruginosum* Stoll, Natuurl. Afbeeld. Beschr. Spooken, etc., p. 30, pl. XIVb, fig. 52, Register p. 13. [♀; no locality given.]

Southwest Africa: Windhoek; 1 ♂; [A.N.S.P.]. Warmbad; I, 10, II, 10, 19 and 29, 1904; 2 ♂, 2 ♀; [Transv. Mus. and A.N.S.P.].

Transvaal: Pretoria; II, 5, 1905; (C. Swierstra); 1 ♂; [Transv. Mus.]: III, 7 – IV, 16; 2 ♂, 5 ♀; [Univ. of Pretoria and A.N.S.P.]. Barberton; III, 1906, IV, 1905; (Miss de Beer); 1 ♂, 1 ♀; [Transv. Mus. and A.N.S.P.]. Potchefstroom; X, 12; 1 ♀; [Univ. of Pretoria].

Orange Free State: Petrusburg; V, 1, 1918; 1 ♀; [Univ. of Pretoria]. Bloemfontein; III, 7, 1918; 1 ♂, 1 ♀; [A.N.S.P.]. Camperdown; IV, 2, 1908; (G. F. Leigh); 1 ♀; [Transv. Mus.].

Cape Province: East London; II, 26, 1922; 1 ♂; [Univ. of Pretoria]. Victoria West, Victoria West District; VI, 14, 1939; (R. H. N. Smithers); 2 ♂; [A.N.S.P.].

All of the material of this subspecies which I have seen from southern Africa agree in possessing a pronounced medio-longitudinal greenish or greenish yellow pale bar, extending from the vertex to the apex of the anal area of the tegmina, and in the caudal tibiae being washed more or less strongly with red, or at least pink.

KRAUSSARIA Uvarov

Kraussaria prasina (Walker)

1870. *Cyrtacanthacris prasina* Walker, Catal. Derm. Salt. Coll. Brit. Mus., III, p. 562. [♂; Natal.]

Bechuanaland: Metsimaklaba; III, 7-12, 1930; (Vernay-Lang Kalahari Exped.); 1 ♀; [Transv. Mus.]. Gemsbok Pan; IV, 23 – V, 5, 1930; (Vernay-Lang Kalahari Exped.); 2 ♂; [Transv. Mus. and A. N. S. P.]. Kaotwe Pan; IV, 8-12, 1930; (Vernay-Lang Kalahari Exped.); 1 ♂; [Transv. Mus.]. Damara Pan; IV, 15-21, 1930; (Vernay-Lang Kalahari Exped.); 3 ♂, 1 ♀; [Transv. Mus. and A.N.S.P.].

Natal: Durban; II, 1908; (F. Jankins); 1 ♂; [Univ. of Pretoria]: III, 29, 1909; (G. F. Leigh); 2 ♀; [A.N.S.P.].

Zululand: Conjeni; IV, 22, 1927; 1 ♀; [Univ. of Pretoria].

"South Africa": 1 ♀; [A.N.S.P.].

Uvarov has discussed the synonymy of this species from the basis of the types involved,[15] but I feel that larger series than are now available will probably demonstrate that Kirby's *Cyrtacanthacris distanti*[16] may be used for an interior race, which in the female has the dorsum of the prozonal section of the pronotum less bullate than in typical *prasina*, and the cephalic and median femora in both sexes more slender and less inflated.

---

[15] Ann. and Mag. Nat. Hist., (9) XIV, pp. 103-104, (1924).

None of the interior specimens here reported (6 ♂, 2 ♀) has the pattern strongly marked or contrasted as in typical Natal individuals, and none has red tibiae. The Natal representatives and that labelled "South Africa" have reddish caudal tibiae and strongly bicolored pronota, while the dorsum of the latter is appreciably subbullate in the females. The female from Conjeni, Zululand is almost uniform pale green, with greenish caudal tibiae. There is no sexual association of greenish or reddish caudal tibiae, as assumed by Sjöstedt from the evidence of a single female. Only the acquisition of more material will show whether *prasina* is dichromatic over most or all of its range, and if so whether the structural tendencies noticed are racial characteristics or purely individual features. At any rate eight Kalahari specimens from four localities differ from three Natal individuals, and agree with one another, in these respects.

In 1924 Uvarov reported *prasina* from Natal; Pretoria, Transvaal; Salisbury, Mashonaland; and Lourenço Marques, Portuguese East Africa, and subsequently, in 1929, from Kaoki Otavi, Southwest Africa. The present are the first Bechuanaland Kalahari records. Whether *prasina* passes into *K. dives* (Karsch), of eastern Tanganyika and Kenya, remains to be determined.

---

[16] Trans. Entom. Soc. London, 1902, p. 103. [Pretoria, Transvaal (type designation by Uvarov, 1924); Natal.]

NOTULAE NATURAE

NUMBER 138 OF JUNE 28, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW RACE OF PYRRHURA RUPICOLA FROM PERU

BY JAMES BOND AND RODOLPHE MEYER DE SCHAUENSEE

Department of Birds, The Academy of Natural Sciences of Philadelphia

It has come to our attention that there are two distinct races of this rare paroquet, the nominate form from central Peru and a southern race from southeastern Peru and, apparently, the Yungas of Bolivia. For the latter we propose the name

Pyrrhura rupicola sandiae new subspecies

TYPE.—♀ ad., A.N.S.P., no. 103847, collected at La Pampa, Sandia, Dept. Puno, southeastern Peru, July 3, 1931, by M. A. Carriker, Jr.

Description.—Differs from the nominate form in having much narrower hoary margins to the feathers of the throat and foreneck. These pale edgings measure only 2–2.5 mm. in width (specimens in fresh plumage) as compared with 4–5 mm. Thus the dusky basal portion of these feathers is more prominent. In addition, the whitish edgings to the feathers of the hindneck are virtually obsolete and those on the sides of the neck much reduced.

Measurements of type.—Wing 135, tail 125, bill (from cere) 17, tarsus 12 mm.

Range.—Southeastern Peru (Dept. Puno), south to the "Yungas" country of Bolivia.

Specimens Examined.—*Pyrrhura rupicola rupicola.*—Peru, "Chanchamayo", 1 ♂[1] (wing 133 mm.); La Gloria, Chanchamayo, 1 ♂[1] (wing 134.5 mm.); Vitoc, Chanchamayo, 1 ♀[1] (wing 131 mm.); Eneñas, Chanchamayo, 1 ♂ (wing 128.5 mm.), 1 ♀ (wing 133 mm.). *Pyrrhura rupicola sandiae.*—Peru, La Pampa, Sandia, 2 ♀ (wing 134.5–135 mm.); Bolivia, "Yungas, S. 18°, 6000 ft.", o[1] (wing 127.5 mm.).

---

[1] We are indebted to Mr. John T. Zimmer for the loan of these specimens. which are in the collection of the American Museum of Natural History, New York.

Remarks.—Unfortunately one of Tschudi's cotypes of *rupicola,* in the collection of the U. S. National Museum, is not at present available for comparison, but Mr. Zimmer, of the American Museum of Natural History, informs us that all of Tschudi's exploration in Peru was confined to the central portion of this republic. Furthermore, the bird figured in his " Untersuchungen Ueber die Fauna Peruana " (pl. 26, fig. 1) and that in the " Catalogue of Birds in the British Museum " (vol. 20, pl. 2, fig. 1) indicate the northern bird, as does Salvadori's description (l.c. p. 225), which was presumably based on another cotype, the only example of this species at that time in the British Museum.

Tschudi stated that he found this paroquet abundant in the coastal region south of Lima, which section of the country has been designated as type locality (Friedmann and Deignan, Zoologica, Sci. Contrib. New York Zool. Soc., vol. 27, pt. 2, 1942, p. 50); but no other collector has found it there. It would seem probable that Tschudi's specimens were obtained at some point farther east, perhaps in the Chanchamayo region. The bird is known definitely in Peru only from the eastern cordillera.

The only Bolivian skin examined is a poorly prepared one of Rusby's. The locality given may not be correct, since Rusby is known to have labelled his specimens after returning from his expedition. We know of no other specimen of this species from the well-worked Bolivian " Yungas ".

NOTULAE NATURAE

NUMBER 139 OF JUNE 28, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NEW PELECYPODA FROM THE YORKTOWN FORMATION OF VIRGINIA

BY CECIL B. MCGAVOCK, JR.
University of Virginia

During the summer of 1931 an extensive collection of Yorktown (Miocene) faunas was made by Dr. Joseph K. Roberts, with the assistance of Henry W. Crenshaw, along the lower York and James Rivers preliminary to the preparation of a short bulletin on the Lower York-James Peninsula published by the Virginia Geological Survey (Bull. 37, 1932). During the summer of 1935 the writer spent a few days along the York River in the vicinity of Yorktown, and added to this collection mainly Pelecypoda, and later used both collections in writing a Master's thesis on the Yorktown members of that group. Among the Pelecypoda there appeared certain forms apparently not heretofore described from this locality or horizon. The writer is indebted to Dr. Julia A. Gardner of the U. S. Geological Survey for assistance in the determination of the new species, and to Dr. Horace G. Richards of The Academy of Natural Sciences for assistance in preparing this paper for publication. The types have been presented to The Academy of Natural Sciences of Philadelphia.

Tellina gardnerae new species Figs. 1, 2.

Description.—The walls of valves are relatively thin but not fragile, valve rounded towards anterior, somewhat angular towards posterior, opisthogyrate, beaks inconspicuous, external surface marked by distinct growth lines most of which are uniform, and by feeble development of widely spaced radial lines, and slight fold towards the posterior. Adductor muscle and anterior pedal muscle scars plain, pallial sinus deep and unusually wide, radial markings less prominent on interior, two cardinal teeth in right valve, no lateral teeth, and valves well preserved with moderate polish. The two valves found measure 57 × 9 × 35 mm., and 56 × 9 × 34 mm., in length, width, and height respectively.

Form very close to *T. egena* Conrad (Type A.N.S.P. 16016), also from the Virginia Miocene, but slightly more slender and more pointed posteriorly.

Locality.—Fine sandy beds which are exposed along the York River just above Yorktown.

Collection.—Type and paratype A. N. S. P. (16012).

Diplodonta berryi new species Figs. 3-6.

Description.—Shell is very thin and fragile, almost circular, but flared towards lower posterior end, beak prosogyrate and not prominent, growth lines fairly distinct, muscle scars faint, margins of valve plain, and cardinal teeth small. Length is slightly in excess of height, and form not very ventricose. The dimensions of the holotype are, length 15 mm., height 14 mm., and width 4 mm.

Resembles *D. nucleiformis* Wagner but slightly broader and less gibbous.

Locality.—High and undercut bluff of York River below Yorktown.

Collection.—Type and paratype A. N. S. P. (16012).

Diplodonta conradi new species Figs. 7, 8.

Description.—Valves thin, fragile, less orbicular than *D. berryi*, and with more prominent beak, and also more prosogyrate, one cardinal tooth in left valve, muscle scars indistinct, external ornamentation restricted to concentric lines, slightly more ventricose than *D. berryi*, and dimensions are, length 16 mm., height 16 mm., and width 4 mm.

Also related to *D. soror* C. B. Adams.

Locality.—Fine sandy beds along York River just above Yorktown, Va.

Collection.—Type and paratype A. N. S. P. (16014).

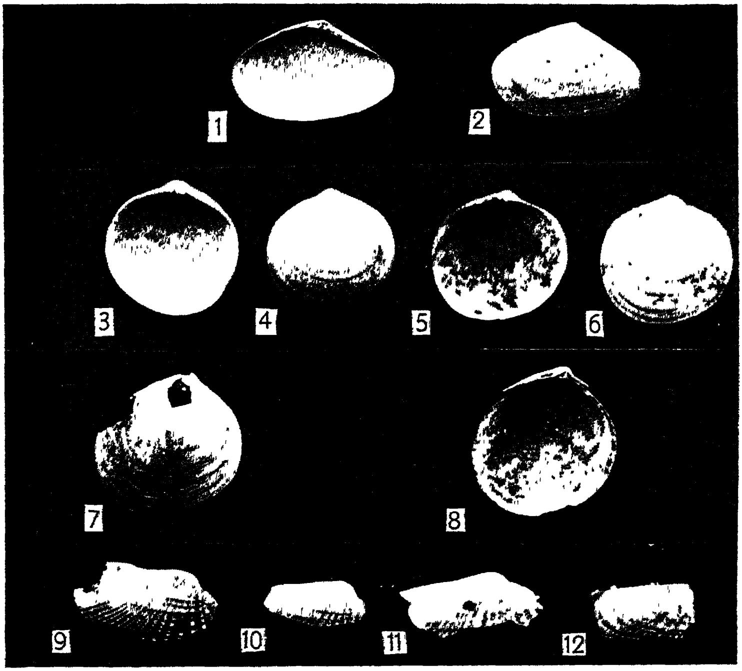
Petricola rogersi new species Figs. 9-12.

Description.—Valve elongate-oval, pointed or slightly angular anteriorly, prosogyrate with beak over one-third the distance to the anterior concentric and radiating lines, forming a distinct pattern which is more prominent anteriorly and ventrally, beaks elevated, hinge short, cardinal teeth posterior to beak, distinct radial markings on the interior but no other ornamentation showing. It is impossible to get correct dimensions as all the valves are broken. The width of the individual valve is around 5 mm.

Locality.—Blue clay lens about midway between the undercut Yorktown bluff below Yorktown and the Moore House.

Collection.—Type and paratypes A. N. S. P. (16015).

Resembles the Pleistocene and Recent *P. pholadiformis* Lamarck, but is smaller and more finely sculptured.



Figs. 1, 2 (1 = type) *Tellina gardnerae* n. sp., × ⅘. Figs. 3-6 (5 = type) *Diplodonta berryi* n. sp., × ⅘. Figs. 7, 8 (8 = type) *Diplodonta conradi* n. sp. × 1 5/16. Figs. 9-12 (9 = type) *Petricola rogersi* n. sp., × 1⅓.

NOTULAE NATURAE

NUMBER 140 OF JUNE 28, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON COLOMBIAN PARROTS

BY RODOLPHE MEYER DE SCHAUENSEE

Curator of Birds, The Academy of Natural Sciences of Philadelphia

During the past few years the Academy has received very extensive collections of birds from Colombia. The field work has been supported by a grant from the American Philosophical Society, and by Charles M. B. Cadwalader and the writer.

The collections are now large enough, and results sufficiently important, that it is felt preliminary papers should be written in advance of a comprehensive study, which is planned when collections are received from parts of Colombia not yet worked. Therefore, this paper is planned as the first of a series to be issued from time to time, in advance of the main paper.

The work in Colombia has been undertaken and directed most ably by Mr. Kjell von Sneidern who has had considerable previous experience as a collector for the Royal Swedish Natural History Museum in Stockholm. The fact that Mr. von Sneidern has not only discovered a new species of pigeon and many new subspecies, but has also rediscovered many birds which were known from one or two specimens attests to his proficiency as a collector.

Many localities at which he collected are mentioned in Chapman's "The Distribution of Bird Life in Colombia" (Bull. Amer. Mus. Nat. Hist., XXXVI, 1917). The location of those that are not will be indicated in the following text.

Ara severa castaneifrons Lafresnaye

This supposedly large race is a rather unsatisfactory one, and has not been recognized by Griscom and Greenway (Bull. Mus. Comp. Zool., 88, no. 3, 1941, p. 140).

Both Messrs. James L. Peters and John T. Zimmer have been kind enough to send me wing measurements of birds belonging to the typical form from Guiana and the lower Amazon, and they do appear to average smaller than birds from more western localities in South America.

If *castaneifrons* is recognized, then Colombian birds should go by that name.

A series of eight birds from that country in the Academy's collection have wings (measured flat against the ruler) as follows:

♂, Villavicencio, eastern Colombia, 249 mm.; ♂, La Morelia, eastern Colombia, 240 mm.; ♀, La Morelia, eastern Colombia, 233 mm.; ♀, La Morelia, eastern Colombia, 233 mm.; ♀, Belén, eastern Colombia, 240 mm.; ♀, Rio Baudó, western Colombia, 233 mm.; o, Rio Baudó, western Colombia, 226 mm. (worn); and ♂, Rio Atrato, western Colombia, 232 mm.

Mr. Peters informs me that the wing of the type of *castaneifrons* from Bolivia has a wing of 245 mm. (chord). Other Bolivian specimens in the Academy's collection measure, ♂ 238, ♀ 244 mm. (flattened). Three males from the Rio Tapajós (*severa*) measure 221, 225, 233 mm. (chord).

In addition to its larger size *castaneifrons* is said to have the cheeks more bare than *severa*, but in Colombian birds this character is variable.

Castaneifrons is not a very good race, but on the basis of the above measurements is recognizable as averaging larger than *severa*.

Aratinga wagleri transilis Peters

A single male collected by von Sneidern at Belén, Caquetá, is very much darker than a series of ten birds of the nominate form collected at El Tambo, in the Cauca Valley, and at Munchique in the Western Andes. It further differs from them by having the red area on the head somewhat darker and more restricted posteriorly.

Peters described *transilis* from the Paria Peninsula, Venezuela, as smaller and darker than the typical form. A series of four birds measured 168–170 mm. Two males secured by Wetmore at San Estebán near Puerto Cabello, Venezuela, and referred by him to *transilis* had wings of 173.5–175 mm. Although my specimen has a wing of 180 mm., it seems best to refer it, on account of its dark color, to *transilis*. The small size of this race may prove only average, for in typical *wagleri* two females from western Colombia show great variation in length of wing, one measuring 176 and the other 192 mm.

This dark form, hitherto known only from the coast of western Venezuela is here recorded from Colombia for the first time and its range extended many hundred miles to the southward.

Aratinga leucopthalmus callogenys (Salvadori)

This is a not unexpected addition to the avifauna of Colombia. Von Sneidern secured seven specimens at La Morelia.

Aratinga weddellii (Deville)

The receipt of a specimen from Belén, Caquetá, extends the range of this widespread, but uncommon species to the base of Eastern Andes in Colombia.

Aratinga pertinax lehmanni Dugand

Caldasia, No. 7, 1943, p. 191 (Caño Quenane east of Villavicencio, llanos de Meta, Colombia).

A single specimen from Villavicencio, by having the primaries and secondaries less blue than British Guiana specimens, is apparently referable to this newly described race.

Leptosittaca branickii Berlepsch and Stolzman

A female secured at Laguneta (10,000 ft.) Central Andes, again extends the range of this fine species northward (see Bond and de Schauensee, Proc. Acad. Nat. Sci., 92, 1940, p. 155). For many years known only from Peru, it was not until 1926 that it was recorded from southeastern Ecuador.

Pyrrhura melanura souancei (Verreaux)

This form has not previously been recorded from Colombia. The range of *souancei* must be fairly restricted and the bird would appear to inhabit extreme western Amazonia in the lowlands, near the base of the Eastern Andes of Colombia and extreme northeastern Peru (formerly a part of Ecuador).

Birds from La Morelia match specimens from the Rio Curaray, and one from Sarayacú, which Chapman compared with the type of *souancei*, in having the grayish bands across the chest well developed.

Not very far to the southward (Puerto Indiana and Apayacú) *melanura* is found. Specimens from these localities are distinguishable from *souancei* by their very narrow and somewhat more vinaceous pectoral bands. Orinocan birds agree fairly well with them.

Bolborhynchus ferrugineifrons Lawrence

This species has hitherto been known from a single " Bogota " specimen. It was collected in 1880. Mr. von Sneidern has solved the mystery of where the bird actually comes from by the capture of two males on the Nevado de Tolima 12,000 ft., in the paramo type of country.

Ferrugineifrons can well be kept distinct from *andicolus*, its closest relative, by its much larger size (wing 122.5–123 against 101–109 [ave. 105], 7 specimens), the rusty markings on the forehead, lores and throat, and very much larger bill.

The color notes given are, " iris dark brown, bill and feet grey ". In *andicolus* the iris is " blue, bill yellowish-olive, feet yellow ".

Brotogerys jugularis jugularis (Muller)

Peters in giving the range of this species says that it is " absent from the Pacific coast and Cauca Valley " and that it occurs in arid country. Von Sneidern, however, secured 7 specimens on the Rio Juradó, and three more on the Rio Baudó, Chocó, on the very wet Pacific coast of Colombia. These specimens are not different from Santa Marta birds.

Touit dilectissima dilectissima (Sclater and Salvadori)

Von Sneidern collected a pair of these rare little parrots on the east slope of the Baudó range (3000 ft.) above the Rio Atrato.

Pionopsitta barrabandi (Kuhl)

As this species is known to occur in eastern Ecuador and southern Venezuela it is not surprising to be able to add it to the Colombian list. Von Sneidern secured a pair at La Morelia.

Pionopsitta haematotis coccinicollaris (Lawrence)

This species occurs in Colombia near the Panama border at Juradó, where three specimens were secured. They show no approach to *P. pulchra*. (See Bond and de Schauensee, Monogr. Acad. Nat. Sci. Phila., 6, p. 28, 1944.)

Graydidasculus brachyurus brachyurus (Kuhl)

New to Colombia. Two males were collected at La Morelia. The wings measure 149 and 154 mm.

Pionus chalcopterus cyanescens new subspecies

TYPE. — ♂ ad., A.N.S.P. no. 150587, collected at Ricaurte (3900 ft.), Nariño, southwestern Colombia, by Kjell von Sneidern on April 1, 1941.

Description. — Similar to *Pionus chalcopterus chalcopterus* (Fraser) of Bogotá, but smaller and with the lower surface averaging bluer, less bronzy.

Measurements of type.—Wing 181, tail 77, culmen from cere 26.5 mm.

Range.—From the Province of Nariño, southwestern Colombia, through Ecuador into northwestern Peru (La Laja, Piura).

The measurements in detail of 24 specimens of *chalcopterus* are as follows: 192 (2), 194 (2), 195 (3), 196 (1), 198 (4), 199 (2), 200 (2), 202 (1), 203 (2), 204 (1), 205 (2), 207 (1), 208 (1). The average wing measurement for twenty-four birds measured, including the specimen from El Tambo (wing 188 mm.), is 194.5 mm.

Detailed wing measurements of 30 birds from Nariño southward are as follows: 167 (1), 168 (1), 171 (1), 172 (1), 175 (1), 176 (2), 177 (1), 177.5 (1), (Cajamarca), 178 (1), 178.5 (1), 180 (1), 181 (2), 182 (2), 182.5 (1), 183 (3), 183.5 (1), 184 (2), 185 (1), 186 (2), 187.5 (1), 190 (1), 191 (2). Average for the thirty birds is 180.5 mm.

Toward the southern part of the range of the typical form the size, as might be expected, is unstable; thus from El Tambo a ♀ measures 188 mm. whilst other birds from the region measure over 196.

Mr. John T. Zimmer very kindly allowed me to measure the fine series in the American Museum of Natural History.

Specimens examined. — *Pionus chalcopterus chalcopterus*, 27; from "Bogotá" 3, Rio Zapata 2, east of Palmira 4, Andalucia 1, La Candela 1, Toché 4, Salento 1, La Plata 1, Alto Bonito 1, Munchique 2, El Tambo 1, Rio Munchique 1, La Costa 1, Jericho 1, near San Agustin 1, La Florida 2, Colombia. *Pionus chalcopterus cyanescens*, 31; from Ricaurte 6, Perlasiví 1, Colombia; Cebollal 2, Santa Ana 1, Paramba 6, Alamor 3, Gualea 1, Nanegal 2, Santo Domingo 1, Rio de Oro 2, Mindo 3, Puente de Chimbo 1, Bucay 1, Ecuador; La Laja 1, Peru.

Amazona ochrocephala nattereri (Finsch)

This species was not previously known from Colombia where it occurs in the southeastern part of the country (a pair from La Morelia). Further north, east of the Andes the nominate form is found (Villavicencio, Barrigon).

NOTULAE NATURAE

NUMBER 141 OF JUNE 28, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON COLOMBIAN WOODPECKERS, WITH THE DESCRIPTION OF A NEW FORM [1]

BY RODOLPHE MEYER DE SCHAUENSEE
Curator of Birds, The Academy of Natural Sciences of Philadelphia

Piculus rubiginosus pacificus new subspecies

TYPE.—♂ ad., A.N.S.P. no. 142,414 collected on Munchique (5700 ft.) Western Andes of Colombia, by Kjell von Sneidern on December 3, 1938.

Description.—Differs from *Piculus rubiginosus gularis* (Hargitt) of the Central Andes of Colombia by smaller size, and perhaps slightly less golden, more greenish-yellow under parts.

Measurements of type.—Wing 117, tail 69, culmen 24 mm.

Range.—The southern portion of the Western Andes, (but not Nariño) and the upper Cauca Valley.

Remarks.—The wings of a series of 15 birds in the Academy's collection from San Antonio, El Tambo and Munchique, western Colombia, measure 112–120 mm. (average 114.8 mm.). Nine birds in the collection of the American Museum of Natural History from San Antonio, Munchique, Maria Lopez, Cali, and Cocal, western Colombia, measure 113–119 mm. (average 115.6 mm.). Four birds in the Academy's collection from the Central Andes (Toché and Salento), referable to *gularis*, measure 125–131 mm. (average 128.2 mm.). Five birds in the American Museum from the Central Andes (La Frijolera, east of Palmira, La Candela, and Salento, measure 123.5–127.5 mm. (average 125.3 mm.).

As the size difference is absolute with no overlap, the West Andean bird should be recognized by name.

In color this is a most variable species and hardly any two specimens are alike as to the barring of the underparts, or of the yellow forming the background to the bars, or for that matter, the presence or absence of spotting on the throat.

---

[1] For explanatory remarks on this series see Notulae Naturae no. 140, 1944.

Piculus rubiginosus rubripileus (Salvador and Festa)

In Nariño a different race of *rubiginosus* from that found north of the Rio Patia exists. In size it matches *rubripileus*, being smaller than *pacificus*. A " ♂ " and a ♀ from Ricaurte (3900 ft.), Nariño, have wings of 107 mm. each and culmens of 22 mm. In color, however, they are very much darker than any of the eight specimens of *rubripileus* examined from Peru and Ecuador. They in all probability represent an undescribed race, but in so variable a species it seems wiser to see more specimens before a definite conclusion is reached, especially as these two do not appear to me absolutely adult. It is interesting to note in this connection that Dr. Chapman has remarked that Ecuadorean birds are darker than those from Peru.

My two specimens represent the northern extremity of the range of what is now called *rubripileus*, and probably the northern population is separable from that at the southern end of the range.

Piculus flavigula magnus (Cherrie and Reichenbacher)

Two specimens from La Morelia apparently belong to this race for they have wings of, ♂ 121, ♀ 119.5 mm. The species has not previously been recorded from Colombia.

Chrysoptilus punctigula guttatus (Spix)

An immature female is recorded by Dr. Chapman from La Morelia, and no specimens were recorded from Ecuador by Chapman in 1926. This race is apparently not uncommon in southeastern Colombia for von Sneidern secured 9 specimens at La Morelia.

The spots on the lower surface are not larger than in Peruvian specimens and therefore they cannot be *notata* Cory, described from an unknown locality in Colombia.

Celeus jumana citreopygius Sclater and Salvin

This species, previously recorded from Leticia, Amazonas, occurs northwestward in Colombia to La Morelia where von Sneidern secured four specimens.

Celeus grammicus verreauxi Malherbe

Four specimens secured at La Morelia add this species to the Colombian avifauna. This slightly barred form was described from Ecuador.

Crocomorphus flavus peruvianus Cory

This is a most interesting addition to the Colombian avifauna. Known previously from northern Peru, its range is extended hundreds of miles northwards. Colombian specimens are inseparable from those of Peru, and if anything can be said about them, one might say that they average a trifle brighter and clearer yellow.

Von Sneidern secured three males and one female at La Morelia.

Ceophloeus lineatus nuperus Peters

Birds from El Tambo and Nuquí show no approach toward *fuscipennis* and are similar to birds from Juradó near the Panama border on the Pacific slope.

Megapicos pollens pollens (Bonaparte)

Birds from the Central Andes average less regularly barred below, the bars tending toward squamiform marks, and the birds are larger than West Andean specimens.

A series of eight birds from Laguneta, La Plata and Coconuco measure (174 one), 177–184 (average 180.4 mm.) whilst 14 birds from La Costa, Munchique, San Antonio, Rio Michengue and Mayasquer measure 162–176 mm. (average 170 mm.). A pair from western Ecuador measure ♂ 169, ♀ 172 mm.

Picumnus lafresnayei Malherbe

Von Sneidern secured a pair of this piculet at Belén, Caquetá, thus adding the species to the bird fauna of Colombia.

NOTULAE NATURAE

NUMBER 142 OF JUNE 30, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTION OF A NEW GENUS AND A NEW SPECIES OF AMERICAN STROMATEID FISHES

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

The two fishes reported herein are contained in the general series of our collections of the Stromateidae. One represents a new species of harvest fish from the Gulf of Mexico, and the other is defined as a new and related genus from Brazil.

Peprilus burti new species Gulf Harvest Fish Figure 1.

Poronotus triacanthus (not of Peck) Fowler, Proc. Biol. Soc. Wash , vol. 46, 1933, p 61 (Breton Island, La.) (misidentification).

Depth $1\frac{3}{5}$ to $1\frac{4}{5}$, contour deeply ovoid; head $3\frac{1}{4}$ to $3\frac{2}{5}$, width $1\frac{7}{8}$ to $2\frac{1}{4}$. Snout (in profile) $3\frac{2}{5}$ to $3\frac{1}{2}$ in head, as measured from snout tip; eye $3\frac{1}{3}$ to $3\frac{2}{3}$, subequal with snout, $1\frac{1}{4}$ to $1\frac{2}{5}$ in interorbital, margin all around more or less adipose-like; maxillary not quite reaching opposite front of eye, length $3\frac{2}{3}$ to $3\frac{7}{8}$ in head measured from snout tip; mouth small, closed lower jaw slightly protruded; bands of fine villiform teeth in jaws, none on palate; interorbital $2\frac{7}{8}$ to 3 in head, elevated convexly. Gill opening extends forward opposite front eye edge. Gill rakers 5 + 17, lanceolate. 2 in gill filaments, which are $1\frac{2}{5}$ in eye.

Tubular scales about 68 in lateral line to caudal base, which is arched high in its course, and slopes down along upper side of caudal peduncle to near its center; about 12 scales above arch of lateral line to dorsal base, 50 below to front of anal base. About 21 to 23 pores in upper auxiliary lateral line, largely below front of dorsal. Head naked. Fins, except largely naked pectoral, densely and finely scaled and on dorsal and anal nearly or quite to their margins.

D. I, III, 43 to 45, first spine short and directed forward, third longest though also short, third ray $1\frac{1}{2}$ to $1\frac{3}{5}$ in total head length; A. I. II, 40 or 41, first spine short and directed forward, second spine short though longest, third ray $1\frac{1}{3}$ to $2\frac{1}{4}$; caudal peduncle depth 3 to $3\frac{1}{5}$; caudal $2\frac{1}{4}$ to 3 in rest of fish, long slender lobes sharply pointed; pectoral $2\frac{7}{8}$ to $3\frac{1}{3}$, rays I, 19 to I, 20. Vent close before first antrorse anal spine.

Color in alcohol with back pale olive brown, sides and below pale, evidently bright silvery white in life. Iris grayish, apparently whitish in life. Fins all dull brownish. Dorsal and anal with numerous dark brown dots on outer portions and within hind crotch of caudal. Pectoral pale, inner surfaces of rays with brown dots.

A.N.S.P., no. 55841. Breton Island, Louisiana. November 1930. Morrow J. Allen. Length 170 mm. Type.

A.N.S.P., nos. 55842 to 55843. Same data as type. Length 100 to 110 mm. Paratypes.

A.N.S.P., nos. 70943 to 70945. Galveston, Texas. 1943. Charles E. Burt. Length 91 to 97 mm. Paratypes. These all with rather dark outer portions to all the vertical fins.

This species is apparently related to the Pacific *Peprilus palometa* (Jordan and Bollman)[1] which differs in the shorter snout (4.7 to 5.4 in head), jaws equal, maxillary scarcely reaching anterior margin of pupil, and scales covering cheeks and preopercles. In the region " above lateral line without evident pores ", according to Jordan and Bollman, though in *Peprilus burti* they are quite distinct, if not conspicuous.

(Named for Prof. Charles E. Burt, from whom I have received many American fishes.)

SIMOBRAMA new genus

TYPE.—*Seserinus xanthurus* Quoy and Gaimard.

Body deeply and evenly ovoid, strongly compressed, greatest depth about ⅔ its length. Head small, with very gibbous evenly rounded or convex upper front profile. Snout very short, broad, its front profile vertical. Eye moderate, lateral, greater than snout, and veiled in front and behind by moderately broad adipose lids. Maxillary short, reaching below and slightly behind front edge of eye. Lips rather thin. Teeth above in very narrow feeble row, small, short, close set, and below little larger though otherwise similar. Also above, rather broad band of finely granular or villiform teeth. Interorbital elevated slightly, greater than eye. Gill opening extends forward opposite front of eye. Gill rakers lanceolate. Head largely scaly, muzzle naked and rather large scales about hind and lower borders of eye, also whole top of head and predorsal region scaled. Lateral line complete, well arched and slopes down behind to base of upper caudal lobe. Dorsal elevated little in front, with height of lobe less than head, preceded by one forward-directed spine and 3 low spines following and graduated up to third. Anal similar to dorsal, front lobe longer or slightly longer than head, with forward-directed spine and 2 low spines following, of which posterior is higher. Caudal peduncle narrow, compressed. Caudal much longer than head, deeply forked, with long, slender, equal lobes. Pectoral long, not quite reaching half way to caudal base.

---

[1] *Stromateus palometa* Jordan and Bollman, Proc U. S. Nat. Mus., vol. 12, 1889, p. 156 (type locality, lat. 8° 16′ 30″ N., long. 79° 37′ 45″ W., off Colombia).

Peprilus palometa Meek and Hildebrand, Field Mus. Publ., no. 226, Zool. ser., vol. 15, pt. 2, April 15, 1925, p. 412 (Panama City).

This genus is proposed for the Brazilian species here noted, and usually associated with *Peprilus*. It differs, however, in its entirely dissimilar physiognomy, especially in the protruding vertical snout and strongly arched upper profile of the head, partly veiled iris, enlarged scales below and behind the eye, scalation and fins.

(σιμὸς snub-nosed + *Brama* bream, or pomfret, to which latter it bears a superficial resemblance.)

Simobrama xanthura (Quoy and Gaimard) Snub-nosed Harvest Fish Figure 2.

Seserinus xanthurus Quoy and Gaimard, Voy. Uranie, Zool., 1824, p. 384 (type locality Rio de Janeiro) (D. IV, 45; A. III, 44).—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, p. 119 (specimen here studied).

Sesserinus xanthurus Fowler, Arquiv. Zool. São Paulo, vol. 3, art. 6, 1941, p. 152 (reference) (error).

Rhombus xanthurus Cuvier, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 9, 1833, p. (301) 405 (Brazil) (D. IV, 40; A. III, 39).—Jordan and Evermann, Bull. U. S. Nat. Mus., no. 47, pt. 1, 1896, p. 966 (compiled).

Stromateus paru (not Linnaeus) Fordice, Proc. Acad. Nat. Sci. Phila., 1884, p. 312 (part; misidentification).

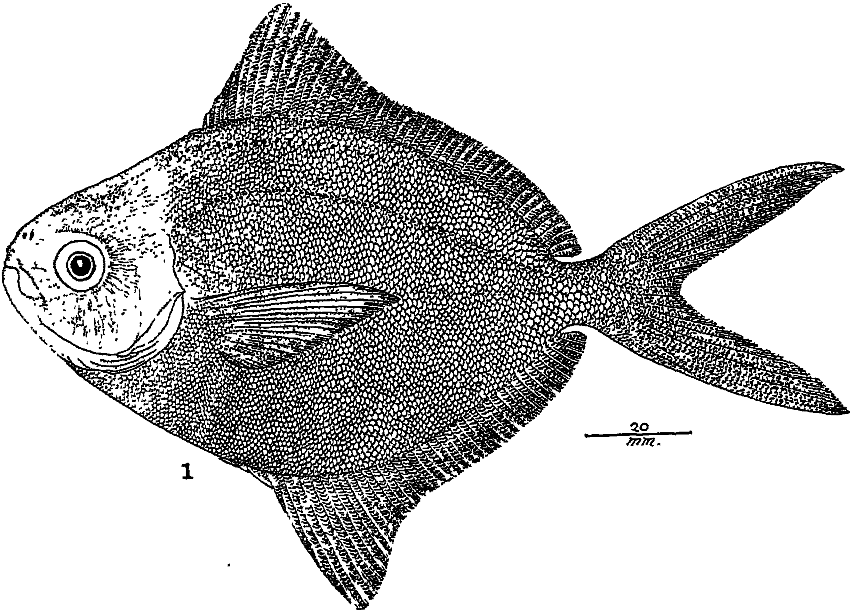
Depth $1\frac{2}{3}$; head $3\frac{4}{5}$, width $1\frac{2}{7}$. Snout (length in profile) $5\frac{1}{2}$ in head; eye $2\frac{2}{3}$, greatly exceeds snout, subequal with interorbital; maxillary oblique, extends down slightly below lower eye edge, leaving very narrow preorbital; mouth cleft short, width $\frac{3}{4}$ of eye; lower jaw inferior; interorbital $2\frac{2}{5}$, greatly elevated. Gill rakers 5 + 8, $\frac{3}{7}$ of gill filaments, which are $1\frac{2}{3}$ in eye.

Scales mostly fallen, all fine and dense over most of body and fins. Tubes in lateral line 56 to caudal base; 10 scales above arch of lateral line to base of dorsal fin, 36 below to front of anal; 8 below eye on cheek.

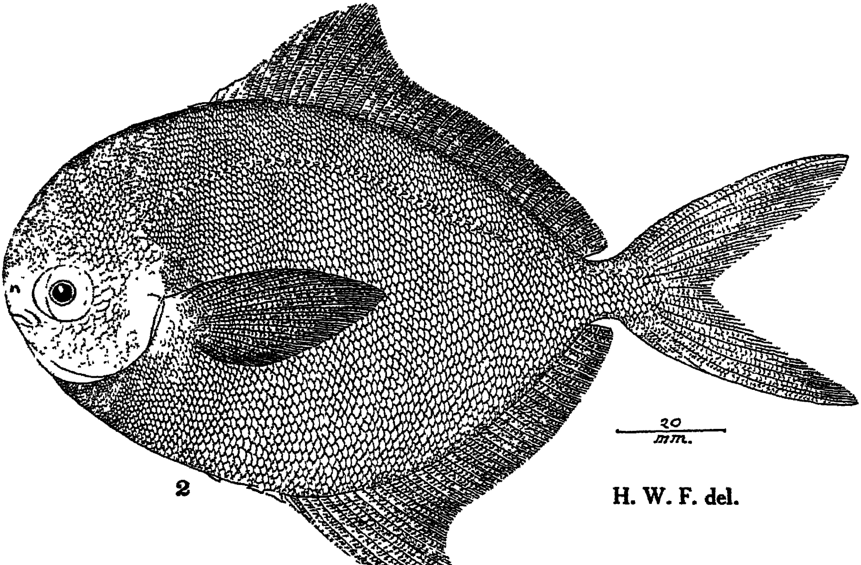
D. I, III, 42, eighth branched ray $1\frac{2}{7}$ in head; A. I, II, 40, third branched ray $3\frac{2}{5}$ in fish without caudal; caudal $2\frac{1}{2}$, well forked; pectoral 3, rays 19; ventral indicated only as small median fixed spine before vent.

Color in alcohol pale brownish, lighter to pale straw brown below. Traces of silvery sheen on sides of head and cheeks, on opercle and caudal basally. Iris pale yellowish. Dorsal and anal grayish, with dark scattered, though inconspicuous dots. Pectoral and caudal pale or light yellowish.

A.N.S.P., no. 11,376. Rio de Janeiro, Brazil. Museum of Comparative Zoology. Length 157 mm.



1



2

Fig. 1.—*Peprilus burti* new species
Fig. 2.—*Simobrama xanthura* (Quoy and Gaimard)

NOTULAE NATURAE

NUMBER 143 OF JULY 7, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

MOLLUSKS FROM THE EOCENE SANTEE LIMESTONE, SOUTH CAROLINA

BY ANNE HARBISON

Associate Curator of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia

INTRODUCTION

Through Dr. Horace G. Richards, Associate Curator of the Department of Geology and Paleontology of the Academy of Natural Sciences, a small collection of Eocene fossils from the Santee-Cooper Canal northwest of Moncks Corner, South Carolina, was presented to the Academy and offered to the writer for study. These fossils were collected through the cooperation of Dr. Stephen Taber, State Geologist of South Carolina, and Mr. W. Bernard Cormack of the South Carolina Public Service Authority.

The purpose of the paper is to list and illustrate the fossils from this locality and to present evidence for the correlation of the Santee beds in which they occur with certain Jackson deposits of the Gulf Coast and especially with the Castle Hayne formation of North Carolina. The work was aided by a grant from the Johnson Fund of the American Philosophical Society. The writer is indebted for helpful suggestions and advice to Dr. H. A. Pilsbry, Dr. B. F. Howell, and Dr. H. G. Richards of the Academy of Natural Sciences, and to Dr. Katherine V. W. Palmer of the Paleontological Research Institute, Ithaca, N. Y.

PREVIOUS WORK ON THE SANTEE FORMATION

Lyell,[1] in 1845, was the first to recognize the presence of Eocene deposits in South Carolina. He secured fossils from the Santee formation but did not describe the fauna. Among the other early workers who briefly mentioned the South Carolina Eocene were Emmons, Kerr, and Heilprin.

---

[1] Lyell, Charles, Geol. Soc. London Quart. Journ., vol. I, pp. 429-42, 1845.

In 1915, Cooke,[2] in discussing the age of the Ocala limestone, briefly mentioned fossils occurring in the equivalent Castle Hayne limestone at Wilmington, North Carolina as being of Jackson age. Numerous bryozoans were later reported from the Santee formation at Eutaw Springs, South Carolina, and from the Castle Hayne of North Carolina. These bryozoans were described by Canu and Bassler[3] who considered the beds at both localities to be of middle Jackson age.

Kellum[4] later made a systematic study of the fauna from many outcrops of the Castle Hayne marl in North Carolina. He described a number of new species and brought together the descriptions of earlier workers. This was the first comprehensive study of the Castle Hayne marl and its molluscan fauna.

In 1936, Cooke,[5] in reviewing the previous work on the Eocene of South Carolina, explained that " the Santee contains a profusion of bryozoa and several widely ranging species of shallow-water mollusks that indicate its correlation with the Castle Hayne marl of North Carolina." He, thus, correlated the Santee with the Castle Hayne and stated that the Cooper marl lay conformably above it.

Gardner and Bowles (1939)[6] agreed with Cooke's correlation. They suggested that the Ocala limestone, which lacks the venericards that occur in the Santee and Castle Hayne, failed to contain these pelecypods because it was laid down in waters too deep for inshore faunas, as only echinoids, pectens, and similar forms of less shallow waters have been recovered from these sediments.

Richards[7] in 1943, discussed the Pliocene-Pleistocene fossils in the Santee-Cooper area of South Carolina, which overlie the Eocene.

VERMES

Serpula species Plate 1, fig. 2.

This cast would appear to be a new species, but the outer part of the shell with its distinctive characteristics is absent.

---

[2] Cooke, C. W., U. S. Geol. Surv. Prof. Paper, 95 I, p. 111, 1915.

[3] Canu, F. and Bassler, R. S., U S Nat. Mus. Bull., 106, 1920.

[4] Kellum, L. B., U. S. Geol. Surv. Prof. Paper, 143, 1926.

[5] Cooke, C. W., U. S. Geol. Surv. Bull., 867, 1936.

[6] Gardner, J. and Bowles, E., U. S. Geol. Surv. Prof. Paper, 189 F, pp. 158, 160, 1939.

[7] Richards, H. G., Pliocene and Pleistocene Mollusks from the Santee-Cooper Area, S. C. Notulae Naturae, no. 118, pp. 1-17, 1943.

BRYOZOA

Lunularia distans (Lonsdale) Plate 1, fig. 1.

Lunulite distans Lonsdale, Quart. Journ. Geol Soc. London, vol. I, p. 531, fig., 1845.
Lunularia distans Lonsdale, Canu and Bassler, Bull. U S Nat. Mus., 106, p. 245, pl. 38, figs. 1-20, 1920.

This cast is of a very characteristic species and is easily distinguishable.

COELENTERATA

Flabellum cuneiformis Lonsdale (cf. var. *wailesi* Conrad) Plate 1, fig. 3.

Flabellum(?) *cuneiformis* Lonsdale, Quart. Journ. Geol. Soc. London, vol. I, p. 512, 1845.
Flabellum cuneiformis Lonsdale, U. S Geol. Surv. Monograph 39, p. 60, 1900.

In the Academy of Natural Sciences there is a cast of a *Flabellum*, probably this species, from Wilmington, N. C. (A.N.S.P., no. 12478). The species has also been recorded for Eutaw Springs, S. C.

The Santee cast is smaller than the Wilmington specimen.

MOLLUSCA

PELECYPODA

Arca species Plate 2, fig. 2

The cast is too broken for definite identification but it may be allied to *Arca cuculloides* Conrad, a species from the Claiborne of Alabama.

Pecten (Chlamys) membranosus Morton Plate 1, fig. 7.

Pecten membranosus Morton, Synopsis of the organic remains of the Cretaceous Group, p 59, pl. 10, fig. 4, 1834
Pecten (*Chlamys*) *membranosus* Morton, Kellum, U. S. Geol Surv. Prof. Paper, 143, p. 19, 1926.

One cast is in good condition.

Pecten (Pseudamusium) scintillatus Conrad Plate 1, fig. 4.

Pecten (*Eburneopecten*) *scintillatus* Conrad, Amer. Journ. Conch., vol. 1, p. 140, pl. 10, fig. 4, 1865 (young shell).
Pecten (*Pseudamusium*) *scintillatus* Conrad, Kellum, U. S. Geol. Surv. Prof. Paper, 143, p 19, 1926.

A cast in the matrix is figured; two additional fragmentary specimens.

Pecten biddleana Kellum Plate 1, fig. 5.

Pecten biddleana Kellum, U. S. Geol. Surv. Prof. Paper, 143, p. 20, pl. 2, fig. 4, 1926.

The cast has broken ears but is apparently the species figured by Kellum.

Ostrea cf. **vicksburgensis** var. **mortoni** Gabb Plate 3, fig. 5.

Ostrea panda Morton, Synopsis Cret. Group, pl. 19, fig. 10, 1834 (in part).
Ostrea mortonii Gabb, Proc. Acad. Nat. Sci. Phila., vol. 13, p. 329, pl. 19, fig. 10, 1861.
Ostrea vicksburgensis var. *mortoni* Gabb, Harris, Bull. Amer. Paleont., vol. 6, no 31 p. 14, 1919.

This specimen was broken from the rock fragment containing the *Ostrea sellaeformis* Conrad.

Ostrea sellaeformis Conrad Plate 3, fig. 6.

Ostrea sellaeformis Conrad, Fossil Shells of the Tertiary Formations, p 27, pl. 13, fig. 2, 1832 (upper valve).

Ostrea sellaeformis Conrad, Kellum, U. S. Geol. Surv. Prof. Paper, 143, p. 17, 1926.

Three broken fragments.

Ostrea carolinensis Conrad Plate 4, fig. 2.

Ostrea carolinensis Conrad, Fossil Shells of the Tertiary Formations, p. 27, pl. 14, fig. 1, 1832.

Ostrea carolinensis Conrad, Trans. Wagner Free Instit. Sci, vol. 3, pt. 4, p. 686, 1898.

Conrad reported this specimen from Santee, South Carolina.

Crassatellites species *a* Plate 2, fig. 1

Crassatellites sp. *a*, Kellum, U. S. Geol. Surv. Prof. Paper, 143, p. 22, pl. 3, fig. 1, 1926

This cast is of a young specimen and resembles Kellum's figure.

Crassatellites species *b*

Crassatellites sp. *b*, Kellum, U. S. Geol. Surv. Prof. Paper, 143, p. 23, pl. 3, fig. 2, 1926.

This cast has a broken beak, but is apparently the species figured by Kellum.

Lirodiscus santeensis new species Plate 2, fig. 3.

Shell solid, subovate and large. The later portion of the disk more convex, remainder of the disk with large, undulating ribs with rather wide interspaces.

This fragmentary cast is closely related to *Lirodiscus smithvillensis* Harris.[8] Its characteristic differences are its larger size, the closer interspaces, the more rounded margin, and the wider diameter.

Measurements.—Holotype (A.N.S.P. 16144); diameter 20.0 mm. (incomplete); length 10.4 mm. (incomplete).

Locality.—Santee-Cooper Canal, 17 miles northwest of Moncks Corner, S. C. The related species of *Lirodiscus smithvillensis* Harris of Devil's Eye, Colorado River, Bastrop County, Texas, and Smithville, Bastrop County, Texas is known from the Lower Claiborne.

Venericardia (Venericor) cf. **klimacodes** Gardner and Bowles Plate 2, fig. 8.

Venericardia klimacodes Gardner and Bowles, U. S. Geol. Surv. Prof. Paper, 189, p. 193, pl. 37, figs. 9, 10, 1939.

Shell rather small for the group, light and narrow, a characteristically high umbone, lunule small and deeply sunk. Ribs undetermined with intercostals at the margins. Hinge plate rather high and narrow, beak sharply pointed and recurved, pallial line simple and well-defined.

---

[8] Harris, G. D., Bull. Amer. Paleont., no. 31, p. 89, pl. 31, figs. 17-23, 1919.

The larger and smaller casts are more like *Venericardia klimacodes* than any other described form. As important sculpture is missing, it seems better to refer it to this species rather than to attempt to describe it as new.

Measurements.—Holotype (A.N.S.P. 16138) adult specimen; length 40.2 mm. (incomplete), diameter 35.1 mm. (incomplete).

Locality.—Santee-Cooper Canal, 17 miles northwest of Moncks Corner, S. C. *Venericardia klimacodes* is known from the Jackson at Yazoo City, Mississippi.

Chama richardsi new species Plate 2, figs. 5, 6.

Internal cast of right valve, large, inflated, quadrangular in outline; beaks pointed and twisted slightly; posterior adductor muscle scars subovate, pallial line simple and distinct.

Chama richardsi is related to *Chama* sp. *a* Kellum from the Castle Hayne but the Santee specimens differ in having a more quadrate posterior dorsal end and a deeper and broader sunken area posteriorly.

This specimen is named for Dr. Horace G. Richards.

Measurements. — Type (A.N.S.P. 16410) adult specimen; length 30.0 mm., diameter 30.4. Paratype (A.N.S.P. 16410) young specimen; length 20.5 mm., diameter 20.0 mm.

Locality.—Santee-Cooper Canal, 17 miles northwest of Moncks Corner, S. C.

Phacoides species Plate 2, fig. 4.

The characteristics of this cast are too indistinct for determination.

Cardium palmerae new species Plate 2. fig. 7.

Description of an internal cast.—Shell medium, inflated, position of beak about anterior fourth of the length; umbo high; sculptured with about thirty-two low rounded ribs separated by shallow intervals half the width of the ribs, which are more distinct on the anterior half of the internal cast; posterior area smoother, with external ribs represented by sharp riblets near the lower posterior margins on the middle of the posterior slope; a slight elevation followed by a depression runs to the margin. General outline of shell is most similar to *Cardium robustum* Solander but differs in that the anterior end is more produced.

Measurements.—Holotype (A.N.S.P. 16164); length 45 mm., height 44 mm., semi-diameter 15 mm.

Locality.—Santee-Cooper Canal, 17 miles northwest of Moncks Corner, S. C.

This specimen is named for Dr. Katherine V. W. Palmer.

Cardium (Agnocardia) cf. **claibornense** Aldrich Plate 1, figs. 6, 8.

Cardium (Trachycardium) claibornense Aldrich, Harris, Bull. Amer. Paleont., vol. 6, no. 31, p. 132, pl. 41, figs. 8a, 9, 1919.

Mold large, sculptured with thirty-three ribs which are square in section and covered with v-shaped spines. The ribs are separated by narrower intervals. The hinge was unfortunately broken. The scales on the ribs of this mold are closer together than those of *Cardium claibornense* Aldrich.

Measurement.—Length 29 mm.

Locality. — Santee-Cooper Canal, 17 miles northwest of Moncks Corner, S. C.

Conrad did not figure his *Cardium glebosum*, the type is lost, and the original description is inadequate to permit of any comparison.

Pitar species Plate 3, fig. 4.

This cast is too imperfect for specific determination.

Cytherea species Plate 3, fig. 3.

Two broken casts.

GASTROPODA

Cypraea species Plate 3, fig. 1.

This cast is too broken for identification.

Fusinus abruptus (Tuomey)? Plate 4, fig. 1.

Fusus abruptus Tuomey, Proc. Acad. Nat. Sci. Phila., vol 6, p. 193, 1852.

Fusinus abruptus (Tuomey)?, Kellum, U S. Geol. Surv. Prof. Paper, 143, p. 29, pl. 6, fig. 6, 1926.

This cast is large, well-weathered, and has a broken top whorl.

Conus cormacki new species Plate 3, fig. 2.

Shell solid, thick, turreted; suture deep; the shoulder of the body whorl keeled, the space between it and the suture wide; body whorl strongly convex and curved. Nodose shoulder of whorl must have been definitely pronounced.

One of the characteristics of the genus *Conus* is the straight line of the body whorl while *Conus cormacki* has a curved line. The distinctive features of the species are its strong convexity and the nodose shoulder whorl.

Measurements.—Type (A.N.S.P. 16415) adult specimen; length 25.3 mm. (incomplete), width 20.2 mm.

Locality.—Santee-Cooper Canal, 17 miles northwest of Moncks Corner, S. C.

This specimen is named for Mr. W. Bernard Cormack.

Age of Fauna

	Santee		Castle Hayne	Ocala
	Santee-Cooper Canal, S. C.	Eutaw Springs, S. C.		
Flabellum cuneiformis Lonsdale cf. var. *wailesi* Conrad	×	×	×	
Serpula sp.	×			
Lunularia distans (Lonsdale)	×	×	×	×
Arca sp.	×			
Pecten (Chlamys) membranosus Morton	×		×	
Pecten (Pseudamusium) scintillatus Conrad	×		×	
Pecten biddleana Kellum	×		×	
Ostrea (cf. *vicksburgensis* var *mortoni* Gabb	×			
Ostrea sellaeformis Conrad	×		×	
Ostrea carolinensis Conrad	×			
Crassatellites sp. a	×		×	
Crassatellites sp. b	×		×	
Lirodiscus santeensis n sp.	×			
Venericardia (Venericor) cf *klimacodes* Gardner and Bowles	×			
Chama richardsi n sp	×			
Phacoides sp.	×			
Cardium palmerae n. sp.	×			
Cardium (Agnocardia) cf *claibornense* Aldrich	×			
Pitar sp.	×			
Cytherea sp.	×			
Cypraea sp.	×			
Fusinus abruptus (Tuomey)?	×		×	
Conus cormacki n. sp	×			

Summary

Among the 23 species listed from the Santee limestone of South Carolina, nine have been previously reported from the Castle Hayne of North Carolina, one is comparable to a species of Jackson age from Yazoo County, Mississippi, another of Claiborne age from De Soto, Mississippi, and four are identified as new species. The others are too fragmentary for determination.

The correlation between the Castle Hayne and the Santee is based on the abundance in both formations of *Ostrea sellaeformis* Conrad, *Pecten membranosus* Morton, and the presence of numerous bryozoans and venericards. Kellum[9] states that *Pecten membranosus* Morton is the most abundant, the most widespread, and the most characteristic fossil of the Castle Hayne marl. *Pecten perplanus, Pecten suwannensis,* and *Amusium ocalanum* are characteristic of the Ocala limestone of Florida and Georgia, but none of these have been identified from the Santee material of the canal. According to Cooke,[10] the Santee correlates with the Castle Hayne and is of early Jacksonian age. In his latest correlation table, Cooke[11] indicates that the Castle Hayne represents the lower part of the Jackson. As a result of their extensive study of bryozoans, Canu and Bassler[12] regarded the Santee-Castle Hayne as Middle Jacksonian, and the Ocala limestone as Upper Jacksonian. The lack of characteristic Ocala fossils from the Santee may, therefore, be significant.

On the basis of the mollusks reported in this paper, the Santee and Castle Hayne appear to be lower or more probably middle Jackson. Also, the presence in the Santee and Castle Hayne of venericards, which are lacking from the late Jacksonian upper Ocala beds, might indicate that these two formations are older than late Jackson. Our collection is too small, however, to furnish conclusive evidence as to the position of the fauna within the Jackson.

---

[9] Op. cit., p. 6.

[10] Cooke, C. W., Bull. U. S Geol. Surv., 867, 1936.

[11] Cooke, C. W., Bull. U. S. Geol. Surv., vol. 54, chart 12, 1943.

[12] Canu, F. and Bassler, R. S., U. S. Nat. Mus. Bull, 106, 1920.

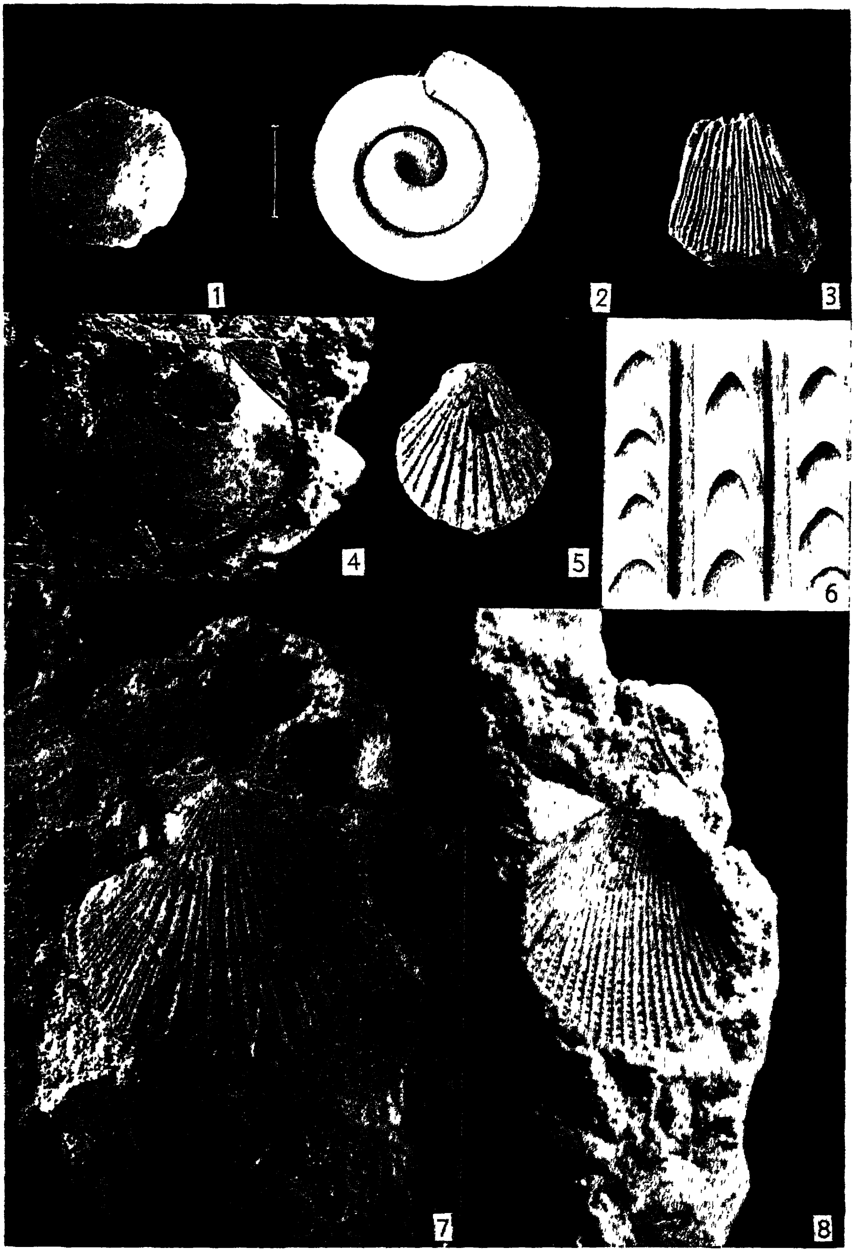


PLATE 1

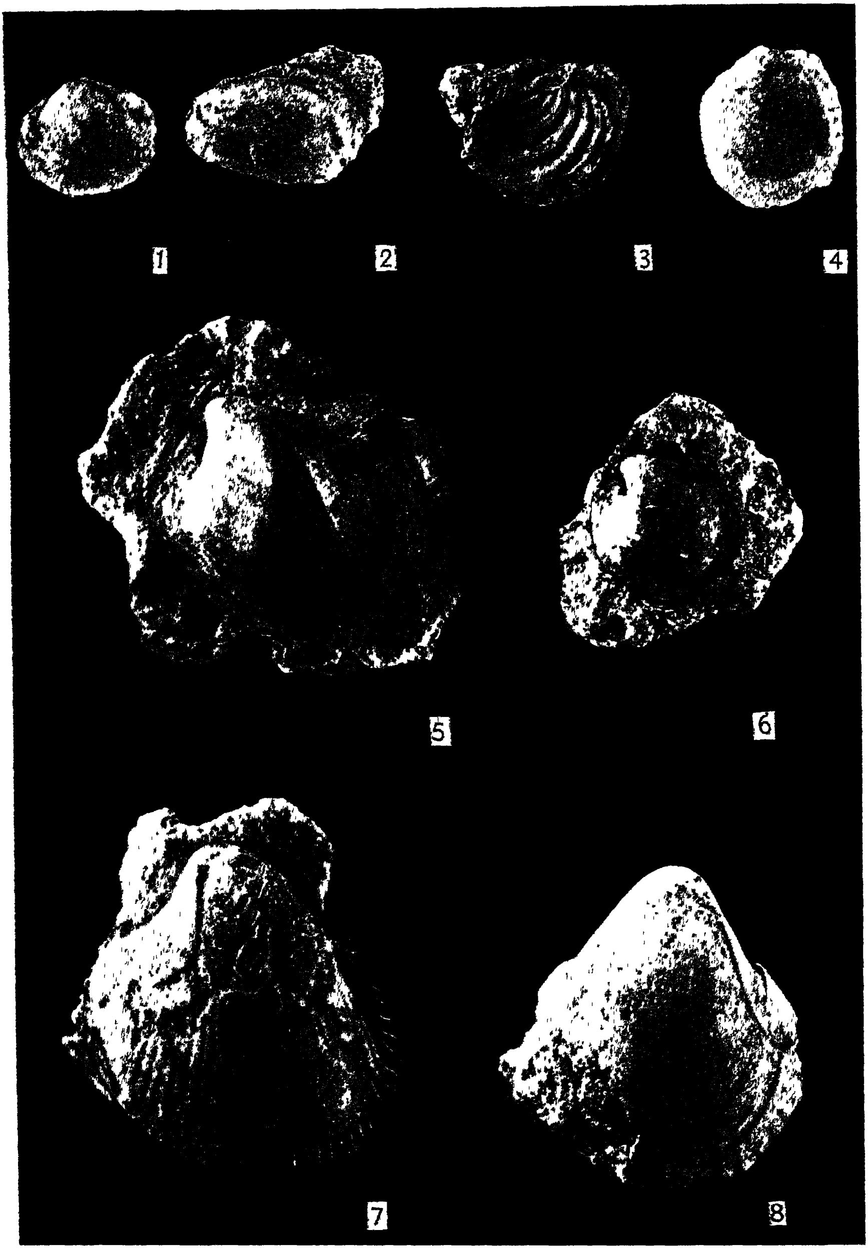


PLATE 2

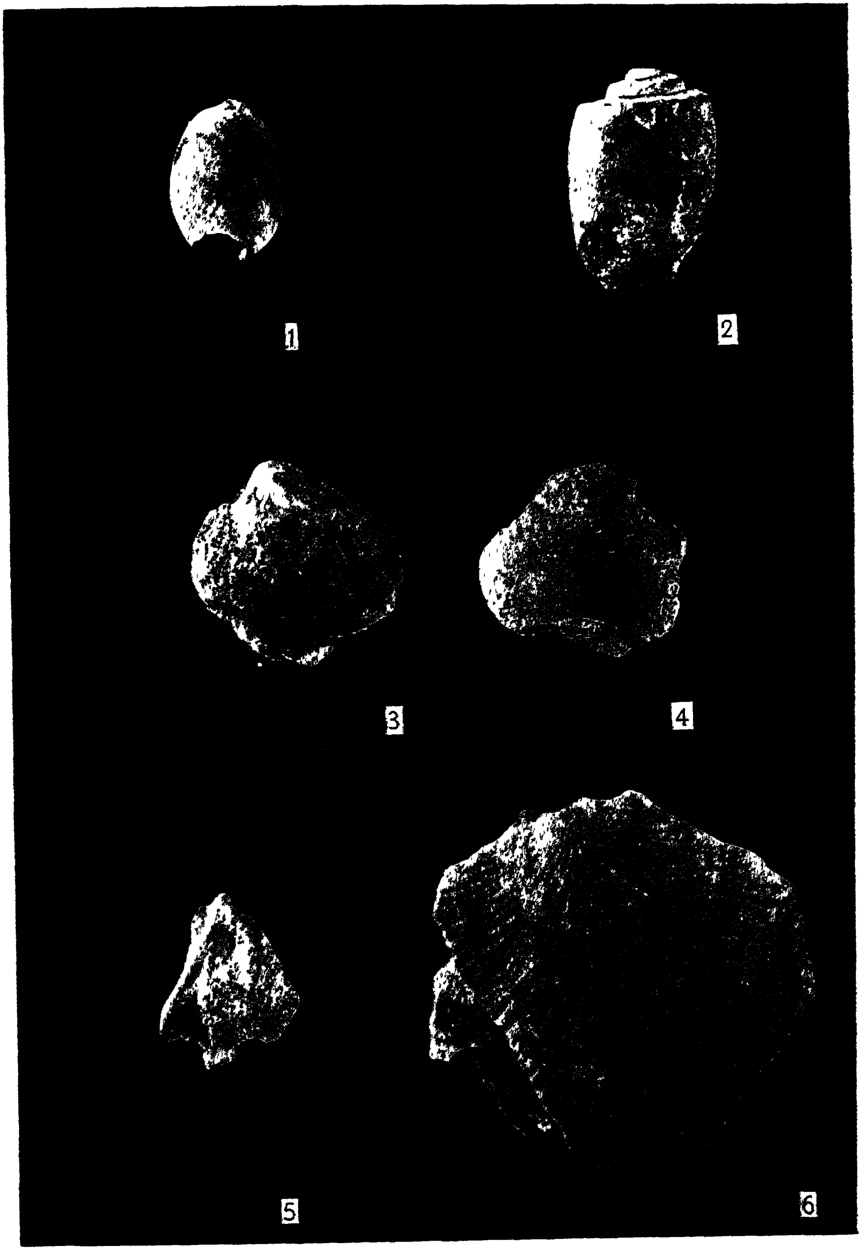


PLATE 3

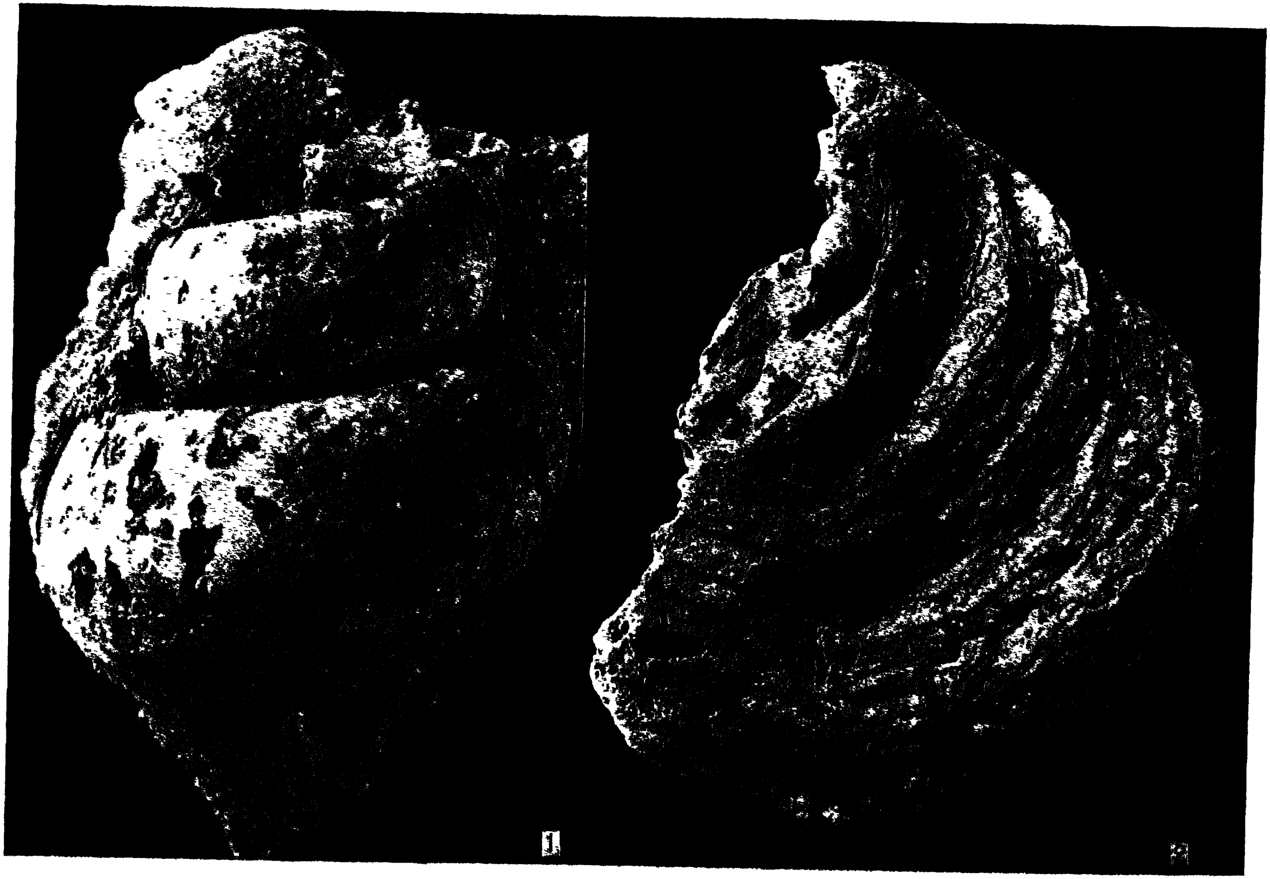


PLATE 4

NOTULAE NATURAE

NUMBER 144 OF OCTOBER 13, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON COLOMBIAN BIRDS, WITH A DESCRIPTION OF A NEW FORM OF ZENAIDA

BY RODOLPHE MEYER DE SCHAUENSEE

Curator of Birds, The Academy of Natural Sciences of Philadelphia

The following paper continues the series of preliminary notes on Colombian birds, which have been recently collected by Kjell von Sneidern. It includes the description of a new form of *Zenaida auriculata.*

Tinamus guttatus Pelzeln

A male secured at La Morelia, Caquetá, adds this species to the Colombian avifauna.

Crypturellus kerriae (Chapman)

This species has been known hitherto by a single female collected on the lower slopes of the Baudó mountains by Mrs. E. L. Kerr in 1912. The first known male was secured by von Sneidern on the west slope of the Baudó mountains at 1500 feet, in 1941.

The appearance of the male strengthens Hellmayr's and Conover's belief that *kerriae* is probably an intensely colored southern representative of *boucardi,* known from Central America. The following is a description of the adult male of *kerriae:*

Entire pileum rather glossy black, changing abruptly to dull chestnut on the hind neck, this color extending over the rest of the upper parts; lower back, scapulars, rump and upper tail-coverts barred indistinctly with black. Tail grayish brown, freckled with black. Wing coverts rather strongly tinged with ochraceous; bend of wing and remiges dusky. Lores and sides of head blackish; chin and throat grayish white, passing to dusky on the fore neck, and changing to grayish ochraceous on the lower neck and breast, the breast feathers finely vermiculated with dusky. Sides of body grayish brown; center of abdomen plain, rich ochraceous. Flanks and under tail-coverts conspicuously barred with black and ochraceous-buff.

Soft parts.—Iris light brown, bill blackish brown, tarsi dark red, toes darker.

Measurements.—Wing (flattened) 177, culmen (exposed) 27, tarsus 53.5 mm.

Colymbus occipitalis juninensis (Berlepsch and Stolzmann)

Previously known from the Andes of Bolivia, Peru and Ecuador, the range of this grebe is extended northward to southern Colombia by the capture of four specimens on Cumbal (12,000 ft.), Nariño.

A chick secured on March 4, shows the species to breed in Colombia.

Butorides virescens maculatus (Boddaert)

An adult female was obtained on the upper Rio Baudó (900 ft.) on July 23, constituting the first record for this species in South America.

The specimen agrees with West Indian and Central American examples of this race.

Porphyrula flavirostris (Gmelin)

Previously known from the eastern half of South America, from the Guianas to Paraguay, a female secured at Florencia, Caquetá, constitutes the first record of the bird from the western half of the continent. This specimen agrees with a female from French Guiana.

Soft parts.—Iris yellowish brown; bill yellowish green, feet yellow.

Columba cayennensis cayennensis Bonaterre

Hellmayr and Conover (Birds of the Americas, XIII, p. 457) examined a " Bogotá " specimen of this pigeon, " suggesting an extension of range of *rufina* (= *cayennensis*) to the eastern foot of the east Colombian Andes."

Von Sneidern secured a male at La Morelia showing definitely that the bird occurs in Colombia.

Columbigallina minuta minuta (Linnaeus)

New to Colombia. Fifteen specimens from La Morelia are very close to the typical form, and show only a slight approach to *elaeodes* (Todd), of northern Colombia.

Zenaida auriculata vulcania new subspecies

TYPE.—♂ ad., A.N.S.P. no. 151192, collected on the volcano of Cumbal (10,500 ft.), Nariño, southwestern Colombia, by Kjell von Sneidern on February 13, 1941.

Description.—The largest form of the *auriculata* group, and the darkest among that section with white-tipped tail feathers.

This new form can be separated easily from *Zenaida auriculata caucae* Chapman, the form it most closely resembles, by its deeper vinaceous chest, rich buff abdomen, blackish instead of grayish greater wing-coverts, by the upper surface averaging darker, and by its much larger size.

From *Z. a. hypoleuca* (Bonaparte) of Ecuador and Peru, *vulcania* differs by its much darker upper parts, very much darker vinaceous chest, rich buff instead of pale vinaceous abdomen, and by its average larger size.

Measurements of type.—Wing 161.5, tail 107, exposed culmen 16 mm.

Range.—Temperate zone of the high mountains of southwestern Colombia.

Material examined.—*Zenaida auriculata vulcania,* 5 ♂, ♂ (?), ♀, Volcanoes of Cumbal and Chiles (10,500-11,100 ft.), Nariño, Colombia. *Zenaida auriculata caucae* Chapman, 7 ♂, ♀, El Tambo (5,100-6,000 ft.), Cauca Valley; Coconuco (9,000 ft.), west slope of the Central Andes, Colombia. *Zenaida auriculata hypoleuca* (Bonaparte), 16 ♂, 9 ♀, Cumbaya (7500 ft.), 6 miles northeast of Quito; Riobamba (9000 ft.); Huigra; Cajabamba, Ecuador. Pisco; Huancano; Cochabamba; Paramongo and Nazca, Peru. *Zenaida auriculata stenura* (Bonaparte), ♂, "Plain of Tolima," Magdalena Valley, Colombia. *Zenaida auriculata pentheria* (Bonaparte), 2 ♂, ♀, 2 indet., Bogotá, Peña Blanca, eastern Andes of Colombia. *Zenaida auriculata chrysauchenia* (Reichenbach), large series from Bolivia and Matto Grosso, Brazil.

The wing measurements in millimeters of the Academy's series of *caucae, vulcania* and *hypoleuca* are as follows: *caucae:* El Tambo, ♂, 141, 145 (3), 146, 148, ♀, 140. Coconuco, ♂, 153. *vulcania* Cumbal: ♂, 161, 161.5, 162, 163, 166, ♀, 155; Chiles, ♂ (? = ♀), 153. *hypoleuca:* Cumbaya, ♂, 151 (? = ♀), 156 (3), 157, 158, 160, 161, ♀, 150 (2), 151 (2), 155; Cajabamba (11,000 ft.), ♂, 145; Riobamba (9200 ft.), ♀, 153, 154; Huigra (4000 ft.) ♂ (? = ♀), 141; Huancano, ♂, 153, 155; Paramongo, ♂, 153, 156, ♀, 144; Pisco, ♂, 153; Cochabamba, ♂, 155.

Remarks.—This new race, *vulcania*, of course belongs to the *auriculata* section with white tips to the rectrices, and therefore has nothing to do with *Z. a. antioquiae* Chapman of the northern end of the Central Andes of Colombia. The latter resembles *stenura,* with deep buff tips to the rectrices, but is larger.

It is interesting to note that the single specimen from Coconuco, at the southern end of the Central Andes, has white-tipped tail-feathers. By its larger size, and slightly darker chest, it is somewhat intermediate between *caucae* and *vulcania.*

The specimen mentioned in this paper from the Plain of Tolima, was collected by Dr. Detwiler, and recorded by Stone as *ruficauda.* The bird probably came from below Ibagüe. Hellmayr and Conover (Field Mus. Nat. Hist., Zool. Series, XIII, pt. 1, p. 481) have placed Stone's record, with a question mark, in the synonymy of *Z. a. caucae,* but Detwiler's bird is typical of *stenura* and should be referred to that form.

Leptotila conoveri Bond and de Schauensee

The receipt of three females from San Agustín, shows that the range of this recently described species extends on the east slope of the Central Andes from Toché to the head of the Magdalena Valley.

L. conoveri is unique among Leptotilae in having the sides of the body finely vermiculated instead of uniform.

Oreopeleia goldmani (Nelson)

An immature quail-dove secured at Juradó (300 ft.) is believed to represent this species. It shows the rufous crown, violet back and black malar streak of *goldmani,* and the breast is changing from a brown, black-barred plumage to gray. Mr. Ludlow Griscom has seen the specimen, and believes, as I do, that it is an immature specimen of *goldmani.*

This rare dove has been known hitherto from Cana, Mt. Pirri, and Mt. Sapo in eastern Darien.

NOTULAE NATURAE

NUMBER 145 OF OCTOBER 18, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE GENERIC POSITION OF CERTAIN MEXICAN POMPILIDAE (HYMENOPTERA), WITH DESCRIPTION OF A NEW GENUS

BY JAMES CHESTER BRADLEY

Cornell University, Ithaca, New York

I have recently had opportunity to examine the types of a number of species of Pompilidae described by E. T. Cresson and W. J. Fox and also specimens of some species described by other authors. All of this material is in the Academy of Natural Sciences of Philadelphia.

As modern hymenopterists have a very different understanding of the characters of the genera of Pompilidae from that which obtained at the time that these species were described, and as few of the species involved have been critically studied by recent authors it has seemed to me worth while to indicate the genus in which each species that I have studied should be placed in the light of recent research. It is natural that in the course of such a study some species should be found to depart from the characters of known genera so widely as to require the erection of new. The classification that I here employ is in the main that of Haupt,[1] but modified by the work of Arnold,[2] of Banks,[3] and of myself [4]. The sequence is my own.

---

[1] Haupt, H. Monographie der Psammocharidae (Pompilidae) Mittel-, Nord- und Osteuropas. Beihefte der Deutsche Ent. Zeitschr., 1926-27, 367 pp.

——————. Weiterer Ausbau meines Systems der Psammocharidae. Mit Beschreibung neuer Gattungen und Arten. Mitt. Zool. Mus. Berlin, 1929, 15: 108-197.

————. Die Einordnung der mir bekannten Psammocharidae mit 2 Cubitalzellen in mein System. Mitt. Zool. Mus. Berlin, 1930, 16: 673-797.

————. Beitrag zur Kenntniss der Psammochariden-Fauna Australiens (Spinnenfangende Wegwespen). Subf. Clavelliinae Haupt. Trib. Calicurgini nov. Zeitschr. f. Naturwissensch., 1937, 91: 121-136.

[2] Arnold, George. The Psammocharidae (Olim Pompilidae) of the Ethiopian Region. Ann. Transvaal Mus., 1932, 14: 284-396, pl. lx; 15: 41-122; 1934, 15: 283-400. pls. i-iv; 1935, 15: 413-483; 1936, 18: 415-460; 1937, 19: 1-98.

————. Some Considerations on a Recent Classification of the Family Psammocharidae. Occas. Papers Rhodesian Mus., 1935, no. 4, pp. 29, 30.

Subfamily PEPSINAE[5]

Haupt[6] and Arnold divide these into two subfamilies, the Macromerinae and Pepsinae, Banks[7] into still more. But since these groups represent degrees of differentiation on a single developmental line, contrasting with the Pompilinae in which specialization is expressed in a different manner, it is better to reduce them to one subfamily.

In them the third discoidal cell is without a basal pocket, the second sternite has a transverse furrow (but not in all males) the hind femora lack spines on the upper surface before the apex; the apex of the hind tibiae bears a row of short parallel spines; the ultimate tarsal segments lack spines beneath, other than at apex, or have them in two rows, one on each side, and the hind tibiae of the females come to develop a dorsal carina which is serrate, often with scale-like teeth.

Tribe CALICURGINI[8]

In this tribe the anterior surface of the pronotum is vertical, forming an angle with the dorsal surface. Haupt, in erecting this tribe, placed it in his Claveliinae.

CALICURGUS Lepeletier

1845. *Calicurgus* Lepeletier (In Roret: Suite à Buffon) Hymén., 3: 397.

Submarginal vein opposite the basal vein, or nearly. ♀: Hind tibiae strongly serrate.

Calicurgus accolens (Cresson) new combination

1869. *Pompilus* (*Agenia*) *calcaratus* var. *accolens* Cresson, Proc. Boston Soc. Nat. Hist., 12: 374. ♂. Mexico: Orizaba.

1897. *Pseudagenia calcarata* var. *accolca* Dalle Torre, Catal. Hymen., v. 8, p. 199

---

[3] Banks, Nathan. Psammocharidae: Classification and Descriptions. Journ. N. Y. Ent. Soc., 1911, 19: 219-237.

———. The Psammocharidae of the Philippines. Proc. Amer. Acad. Arts and Sciences, 1934, 69: 1-117.

———. Some Psammocharidae from Madagascar. Proc. Acad. Nat. Sci. Phila., 1941, 92: 335-362.

[4] Bradley, James Chester. A Preliminary Revision of the Pompilinae of the Americas, Exclusive of the Tribe Pompilini. Trans. Amer. Ent. Soc., 1944, 70: 23-157, pls. iii, iv.

[5] Ashmead, Canad. Ent., 1900, 32: 154.

[6] Haupt, H. Monographie der Psammocharidae (Pompilidae) Mittel-, Nord- und Osteuropas. Beihefte der Deutsche Ent. Zeitschr., 1926-27, 367 pp.

[7] Banks, Nathan. The Psammocharidae of the Philippines. Proc. Amer. Acad. Arts and Sciences, 1934, 69: 1-117.

[8] Haupt, Zeitschr. f. Naturwissensch., 1937, 91: 125.

In this species the submedian vein of the forewing is exactly opposite to the basal vein, and the pronotum has a smooth, vertical, anterior surface; the ultimate sternite is slightly convex, as in some *Priocnemis,* but not tectiform.

The specific name is "*accolens*" not "*accoleus*" as misquoted by Dalle Torre.

Calicurgus impiger (Cresson) new combination

1869. *Pompilus (Priocnemis) impiger* Cresson, Proc. Boston Soc. Nat. Hist., 12: 371. ♀. Mexico: Orizaba.
1893. *Salius impiger* Cameron, Biol. Centr.-Amer Hymen., v. 2, 182.

Calicurgus rupex (Cresson) new combination

1869. *Pompilus (Priocnemis) rupex* Cresson, Proc. Boston. Soc Nat. Hist., 12: 372. ♀ Mexico: Orizaba.
1893. *Salius rupex* Cameron, Biol. Centr.-Amer. Hymen.. v 2, p. 177.
1897 *Salius ruspex* [sic!] Dalle Torre, Catal. Hymen., v. 8, p 239

Tribe PSEUDAGENIINI new name

Pronotum without a vertical surface; hind tibiae not serrate.

The name Pseudageniini must replace Macromerinae used by Haupt[9]. Ashmead[10] erected the subfamily Ageniinae with *Agenia* its type genus. *Agenia* was a preoccupied name and has subsequently been replaced by *Pseudagenia.* The type genus must remain the one established by Ashmead under its new name, *Pseudagenia.* Haupt was in error in attempting to change it to *Macromeris,* the oldest contained generic name.

AGENIELLA Banks

1911. *Ageniella* Banks, Journ. N. Y. Ent. Soc., 19: 222.

♀: Neither labium nor maxillae bear a psammophore of curved bristles. ♂: Antennae not crenulate, apex of abdomen compressed, the ultimate sternite tectiform, carinate.

Since the completion of the manuscript of this paper Banks[11] has established the genus *Nannochilus* for three North American species previously placed in *Ageniella,* but which have the abdomen sessile instead of petiolate as in the other species. I have not noted this character in the types of the two species below, but Cresson's statement in his original description of *Pompilus novellus* that the abdomen is petiolate would seem to settle the position of that species. He did not mention the matter in describing *levipes* which therefore may belong to *Nannochilus.*

---

[9] Beihefte der Deutsche Ent. Zeitschr., 1926, p. 23.

[10] Canad. Ent., 1900, 32: 154.

[11] Bull. Mus. Comp. Zool., 1944, 94: 171

Ageniella novella (Cresson) new combination

1869. *Pompilus* (*Pompilus*) *novellus* Cresson, Proc. Boston Soc. Nat. Hist., 12: 367. ♀. Mexico: Orizaba.

Ageniella levipes (Cresson) new combination

1869. *Pompilus* (*Agenia*) *levipes* Cresson. Proc. Boston Soc. Nat. Hist., 12: 374. ♂. Mexico: Orizaba.

1891. *Pseudagenia levipes* Cameron. Biol. Centr.-Amer. Hymen., v. 2, p. 168.

This appears to be an *Ageniella* if not a *Nannochilus;* the ultimate sternite is narrow, compressed and tectiform.

PSEUDAGENIA Kohl

1884. *Pseudagenia* Kohl, Verh Zool-bot. Ges. Wien, 39: 42.

The females have a psammophore (i. e. beard of stiff curved bristles forming a basket used in removing sand or dust when excavating their burrows) borne on the mentum.

Pseudagenia auripilis (Cresson)

1869. *Pompilus* (*Agenia*) *auripilis* Cresson, Proc. Boston. Soc. Nat. Hist., 12: 373. ♀, ♂. Mexico: Orizaba.

1897. *Pseudagenia auripilis* Dalle Torre, Catal. Hymen., v. 8, p. 198.

The female is the lectotype; the ♂ does not show the deeply emarginate apical margin of the sixth sternite with median projection in the emargination, characteristic of the species of the northeastern U. S., but this may be only characteristic of a group of species and not a generic character.

Pseudagenia chloris (Cresson)

1869. *Pompilus* (*Agenia*) *chloris* Cresson, Proc. Boston Soc. Nat. Hist., 12: 373. ♀. Mexico: Orizaba.

1891. *Pseudagenia chloris* Cameron, Biol. Centr.-Amer. Hymen., v. 2, p. 163.

Pseudagenia mexicana (Cresson)

1867. *Pompilus* (*Agenia*) *mexicanus* Cresson, Trans. Amer. Ent. Soc., 1: 130. (*nec.* Taschenberg 1869). ♀. Mexico: Vera Cruz.

1891. *Pseudagenia mexicana* Cameron, Biol. Centr.-Amer. Hymen., v. 2, p. 163. Mexico: Guerrero; Tabasco; Orizaba; Yucatan.

1897. *Pseudagenia mexicana* Dalle Torre, Catal Hymen.. v. 8, p. 205.

1925. *Pseudagenia mexicana* Banks, Bull. Mus. Comp. Zool., Harvard Univ., 67: 329 Panama.

1931. *Pseudagenia mexicana* Banks, Bull. Brooklyn Ent. Soc., 26: 133. Yucatan.

Pseudagenia mexicana var. **florida** (Cresson)

1869. *Pompilus* (*Agenia*) *mexicanus* Cresson var. *floridus* Cresson, Proc. Boston Soc. Nat. Hist., 12: 373. ♀, ♂. Mexico: Orizaba.

1897. *Pompilus mexicanus* Taschenberg var. *floridanus* Dalle Torre, Catal. Hymen., v. 8, p. 301.

The ultimate sternite of the male is strongly keeled, and the clypeus of this sex has the usual blunt tooth or angle on each side, but the median portion of the anterior margin, instead of being, as usual, evenly concave, is shallowly sinuate, on each side slightly concave, but in the center slightly convex.

Dalle Torre should have listed this as a variety of "*Pseudagenia mexicana* Cresson" on p. 205, instead of "*Pompilus mexicanus* Taschenberg."

Pseudagenia subvirescens (Cresson)

1867. *Pompilus* (*Agenia*) *subvirescens* Cresson, Trans. Amer. Ent. Soc., 1: 131. ♀. Mexico: Vera Cruz.

1891. *Pseudagenia subvirescens* Cameron, Biol. Centr.-Amer. Hymen., v. 2, p. 163. Mexico: Orizaba.

Pseudagenia (Conagenia) sumichrastii (Cresson)

1869. *Pompilus* (*Agenia*) *sumichrastii* Cresson, Proc. Boston Soc. Nat. Hist., 12: 374. ♀. Mexico: Orizaba.

1897. *Pseudagenia sumichrastii* Dalle Torre. Catal. Hymen., v. 8, p. 209.

The clypeus is strongly pointed at the apex; the psammophore is well developed. This large species has not the appearance of other species of the genus with which I am familiar.

DIPOGON Fox

1897. *Dipogon* Fox, Proc. Acad. Nat. Sci. Phila., p. 241.

Wings banded. ♀: The psammophore is formed by a row of bristles on each maxillary cardo. ♂: profile of flagellum crenulate.

Dipogon nubifer (Cresson) new combination

1869. *Pompilus* (*Agenia*) *nubifer* Cresson, Proc. Boston Soc. Nat. Hist., 12: 374. ♀. Mexico: Orizaba.

1891. *Pseudagenia nubifer* Cameron. Biol. Centr.-Amer. Hymen., v. 2, p. 167.

1897. *Pseudagenia nubifera* Dalle Torre. Catal. Hymen., v. 8, p. 12.

PRIOCHILUS Banks

1944. *Priochilus Banks,* Bull Mus. Comp. Zool., 94: 187.

The position of this genus is doubtful. The labial bristles, the very long slender palpi, the "petiolate" first abdominal segment, the shape of the propodeum, and the general appearance indicate relationship with *Macromeris,* and so does the venation, the cells extending well toward the apex of the wing. The second sternite does not have a well-marked transverse furrow, yet is bent in a manner to suggest that one may have once been present. The absence of a pocket in the third discoidal cell would be unusual, yet not unknown in Pompilinae. Nevertheless if the presence of minute spines on the upper surface of the hind femur, and the nature of the spines at the apex of the hind tibiae are as absolutely distinctive of Haupt's "Psammocharidae trachyscelidae" as that author believes, then *Argyrogenia* must be included in the Pompilinae. The presence of only a single row of spines underneath the last tarsal segment, a little to one side of the median line, is indicative of Pompilinae, yet this character occurs in two Chilean genera allied to *Macromeris*.

Priochilus gloriosus (Cresson) new combination

1869. *Pompilus (Pompilus) gloriosus* Cresson, Proc Boston Soc. Nat. Hist, 12: 368. ♀. Mexico: Orizaba.

1893. *Pompilus gloriosus* Cameron, Biol Centr-Amer. Hymen., v. 2, p. 201. ♂. Guatemala: Panama.

The brilliant silvery pile, and the bimaculate wings make this a resplendent insect.

Tribe CRYPTOCHEILINI[12]

The profile of the hind tibiae of the female is serrate above frequently by reason of oblique erect laminae at the bases of stout spines; this is rarely attained in the males. The course of the cubital vein of the forewings in this and Hemipepsini (as also in most Pseudageniini) is comparatively straight, direct and unbroken, its first sector forming a strong angle with the first cubital crossvein, its second forming part of the cephalic margin of the first discoidal cell, which is drawn out beneath it in a long acute angle; the first discoidal cell is without a fenestra; the terminal segment of the hind tibiae is without spines on the upper surface; the claws are bifid or have a single tooth on the inner margin.

PRIOPHANES Banks

1944. *Priophanes* Banks, Bull. Mus. Comp. Zool., 94: 173.

The terminal segment of the tarsi without spines underneath; apical margin of clypeus convex, without a median tooth. This group differs from *Priocnemis* Schiödte in having the abdomen petiolate.

Priophanes sartorianus (Cresson) new combination

1867. *Pompilus (Priocnemis) sartorianus* Cresson, Trans. Amer. Ent. Soc., 1 120. ♀. Mexico: Vera Cruz.

1891. *Salius sartorianus* Cameron, Biol. Centr.-Amer. Hymen., v. 2, p. 179. Mexico: Guerrero.

At the time that I examined the type of *Pompilus sartorianus* I placed it in *Priocnemis*, and I have not had opportunity to re-examine it since the publication of Mr. Bank's genus *Priophanes*. Cresson stated in his original description that the abdomen is subpetiolate, which would seem to place it in *Priophanes*.

---

[12] Banks, Proc. Amer. Acad. Arts and Sciences, 1934, 69:5.

CRESSOCHILUS Banks

1941. *Cressochilus* Banks, Canad. Ent., 73: 119.

The clypeus raised apically, its surface very convex, almost inflated, its apical margin broadly concave and with a median tooth, but both of these characters may be barely indicated; terminal segments of the tarsi without spines underneath, or with a few weak spines on apical ½ or ⅔ only.

Cressochilus orbiculatus (Smith) new combination

1862. *Agenia orbiculata* Smith, Journ. of Ent., 1 397 ♀, ♂. Mexico.
1867. *Pompilus* (*Priocnemis*) *cincticornis* Cresson, Trans. Amer. Ent. Soc., 1. 120 ♀. *teste* R. E. Turner, Ann. and Mag. Nat. Hist, 1915 (8), 17: 334. Mexico: Vera Cruz.
1867. *Pompilus* (*Agenia*) *orbiculatus* Cresson, Trans. Amer. Ent. Soc., 1: 132 ♀, ♂.
1891. *Pseudagenia orbiculata* Cameron, Biol. Centr.-Amer. Hymen. v 2, p. 171
1891. *Salius cincticornis* Cameron, Biol. Centr.-Amer. Hymen., v. 2, p. 174. Mexico: Orizabâ. Guatemala

♀: The apical margin of the clypeus is broadly concave, the median tooth very small; the last segment of the hind tarsi is without spines underneath.

The generic assignment is based on Cresson's type of *cincticornis*, its identity with *orbiculatus* having been indicated by Turner.

Tribe HEMIPEPSINI[13]

This differs from Cryptocheilini in having a fenestra, i. e., a semi-transparent area enclosing an opaque spot, in the first discoidal cell, and the females in having two teeth on the inner margin of the claws; under surface of terminal tarsal segment with a row of strong spines on each side.

HEMIPEPIS Dahlbom

1844. *Hemipepsis Dahlbom,* Hymen Europaea. 1: 123.

Hemipepsis (Hemipepsis) mexicana (Cresson) new combination

1867. *Mygnimia mexicana* Cresson, Trans. Amer. Ent. Soc., 1: 143. ♀. Mexico: Vera Cruz.
1893. *Salius mexicana* Cameron. Biol Centr.-Amer. Hymen., v. 2, p. 183 (misidentification). Mexico: Panama
1893. *Salius rogersi* Cameron. Biol. Centra-Amer. Hymen., v. 2, p. 183. ♀. ♂. *teste* R. E. Turner, Ann. and Mag. Nat. Hist., 1915 (8), 17: 333. Costa Rica.

In this species there are spines, but no scales, on the hind tibiae, which are carinate, but in profile not serrate. According to Turner, Cameron's reference to *Salius mexicanus* in the Biol. Centr.-Amer., p. 183 is a misidentification of that species.

---

[13] Banks, Proc. Amer. Acad. Arts and Sciences, 1934, 69:5.

Tribe PEPSINI new rank

This tribe, as here used, contains only the genus *Pepsis*, and is equivalent to the subfamily Pepsinae of Banks.[14]

Course of cubital vein of forewing tortuous, its first section forming a nearly straight line with the very oblique first submarginal vein, beyond which the second section is deflected obliquely caudad, forming an obtuse angle with the first recurrent vein, the two together forming an angled or 2-sided apical margin for the comparatively short first discoidal cell; terminal segment of hind tibiae with spines above and a row of strong spines on each side underneath.

PEPSIS Fabricius

1805. *Pepsis* Fabricius, Syst. Piezatorum, p. 207.

Pepsis lucasii Fox

1901. *Pepsis lucasii* Fox, Proc. Ent. Soc. Washington, 4: 145, ♀. Texas

Additional record.—Mexico: Tamaulipas; Alta Mira near Tampico, ♀. (Coll. Amer. Ent. Soc.).

Subfamily POMPILINAE [15]

Hind tibiae usually with splayed-out spines of unequal length at apex; the apical portion of the upper surface of the hind femora with a few short spines or spine-pits, at least in the male; hind tibiae never ridged nor serrate; second sternite without a transverse furrow; third discoidal cell most frequently with a basal pocket.

Tribes CTENOCERATINI, EPIPOMPILINI and ALLOCHARINI

These three tribes have been covered by the author in his " A Preliminary Revision of the Pompilinae of the Americas, Exclusive of the Tribe Pompilini." [16]

Tribe POMPILINI [17]

Pronotum with short dorsal but extensive oblique anterior surface; third discoidal cell with a marked pocket at base formed by a basal deflection of the discoidal vein; a single median row of spines under terminal tarsal segment present in all genera recorded below; front femora of ♀ not incrassate, and a tarsal comb frequently present.

---

[14] Proc. Amer. Acad. Arts and Sciences, 1934, 69:4.

[15] Ashmead, Canad. Ent., 1900, 32: 154.

[16] Trans. Amer. Ent. Soc., 1944, 70: 23-157, pls. iii, iv.

[17] Fox, Proc. Acad. Nat. Sci. Phila., 1894.

ANOPLIUS Dufour

1834. *Anoplius* Dufour, Ann. Soc. Ent. France, 2: 484.

♀: Without a tarsal comb; last tergite bristly. ♂: With erect brushes of hair on some of the more apical sternites.

Anoplius lepidus (Say) new combination

1836. *Pompilus lepidus* Say, Boston Journ. Nat. Hist., 1: 303. ♂. Mexico.
1869. *Pompilus lepidus* Cresson, Proc Boston Soc. Nat. Hist., 12: 367. ♂, ♀. Mexico: Orizaba.

The type presumably was destroyed.

A female determined by Cresson as this species is an *Anoplius*, without tarsal comb, and with bristly sixth tergite; the propodeum is hairy; a male, also determined by Cresson, has brushes of hair on sternites 4 and 5.

Anoplius simulans (Cresson) new combination

1869. *Pompilus (Pompilus) simulans* Cresson, Proc Boston. Soc. Nat Hist., 12 367. ♂. Mexico: Orizaba.

Sternites 4 and 5 have brushes of erect hair, a scantier amount also on 3 and 6.

POMPILUS Fabricius

1798. *Pompilus* Fabricius, Suppl. Ent. Syst., p. 212.

Metapostnotum forming a transverse band; margins of clypeus not notched; surface of propodeum evenly rounded, without irregularities; claws of ♀ toothed; tarsal comb long; color black, or black and red or orange.

Psammochares rubriventris new name

1893. *Pompilus connexus* Fox, Proc. Cal. Acad. Sci. (2), 4:23, (nec Cresson 1869). ♀. Mexico: Baja California.

The tarsal comb is long, three spines on the metatarsus, the terminal tarsal segment has only the two basal spines of the median row underneath; the anterior margin of the clypeus is perceptibly concave medially; the propodeum is hairy.

I have seen a paratype in the collection of the American Entomological Society.

ARACHNOPHROCTONUS Ashmead

1902. *Arachnophroctonus* Ashmead, Can. Ent., 34: 83.

Metapostnotum as in *Pompilus;* margin of clypeus with a median notch; surface of propodeum with irregularities and posteriorly a median basin; claws of female toothed; tarsal comb long; color ferruginous and black.

Arachnophroctonus torridus (Smith) new combination

1862. *Pompilus torridus* Smith, Journ. Ent., 1: 396. ♀. Mexico.
1869. *Pompilus (Pompilus) torridus* Cresson, Proc. Boston Soc. Nat. Hist., 12: 371. ♀. Mexico: Orizaba.

Arachnophroctonus torridus var. **burrus** (Cresson)

1869. *Pompilus (Pompilus) torridus* var. *burrus* Cresson, Proc. Boston Soc. Nat. Hist., 12: 371. ♀. Mexico: Vera Cruz.

? Arachnophroctonus anahuacensis new name

1869. *Pompilus mexicanus* Taschenberg, Zeitschr. f. d. gesamm Naturwissenschaft, 34. 52. ♀. (nec *P. mexicanus* Cresson, 1867). Mexico.

This species I have not seen, and refer to it here merely in order to rechristen it and clear up the confusion between it and Cresson's *mexicanus* evident in Dalle Torre's catalog, in which the variety *floridus* of *mexicanus* Cresson is listed as a variety of *mexicanus* Taschenberg. It has a tarsal comb and the propodeum is described as having a complete longitudinal furrow, as well as cross-carinae, from which I infer that it may belong in or near *Arachnophroctonus*.

POECILOPOMPILUS Ashmead

1902 *Poecilopompilus* Ashmead, Canad. Ent., 34: 82.

Metapostnotum concealed in extreme middle, lengthened in a rounded lobe on each side; clypeus not notched; surface of propodeum evenly rounded; claws of female toothed; tarsal comb of moderate length. Ground color ferruginous, more or less marked with yellow.

Poecilopompilus flavopictus (Smith) new combination

1862. *Pompilus flavopictus* Smith, Journ Ent., 1: 396. ♀. Mexico.

1869 *Pompilus (Pompilus) flavopictus* Cresson, Proc. Boston Soc Nat Hist, 12, 370. ♀, ♂. Mexico: Orizaba.

1925. *Batozonus flavopictus* Banks, Bull. Mus. Comp. Zool. Harvard Univ, 67: 388. Panama.

I have not seen the type, but have examined the material recorded by Cresson.

BATOZONUS Ashmead

1902. *Batozonus* Ashmead, Canad. Ent, 34: 81.

Metapostnotum as in Poecilopompilus, but more broadly shortened in center, and the lateral lobes not so pronounced; margin of clypeus not notched; surface of propodeum without irregularities but almost vertical posteriorly; front claws of ♀ bifid; tarsal comb long. Ground color brown to almost black.

Batozonus marcidus (Smith)

1862. *Pompilus marcidus* Smith, Journ. Ent., 1: 395 ♀ Mexico: Orizaba.

1869. *Pompilus (Pompilus) marcidus* Cresson, Proc. Boston Soc. Nat. Hist., 12: 371. Mexico: Orizaba.

1925 *Batazonus marcidus* Banks, Bull. Mus. Comp. Zool. Harvard Univ., 67: 338 Panama.

EPISYRON Schiödte

1837. *Episyron* Schiödte, Naturh. Tidsskr., 1: 341.

Metapostnotum as in Poecilopompilus; margin of clypeus not notched; surface of propodeum regular; all claws of ♀ cleft; tarsal comb long; propodeum and tergite 1 with appressed scales. Ground color black.

Episyron porus (Fox) new combination

1894. *Pompilus porus* Fox, Proc. Calif. Acad Sci., (2), 4: 98. ♀, ♂. Mexico: Baja California.

DICYRTOMALIS new genus

♂: Head flat behind, the occiput and vertex meeting sharply, from above transverse, evenly but not strongly convex in front, from in front nearly round, the eyes converging a little below; antennae situated at lower $\frac{1}{3}$ of eyes, at clypeal margin; antennae fusiform, very short, shorter than length of pronotum and mesonotum, segments mostly wider than long, the third barely longer than second; clypeus transverse, with convex surface, convex anterior margin which is produced into a short broad median lobe; eyes reaching mandibles, the temples very narrow. Profile of entire dorsum evenly curved, the pronotum transverse, a little narrowed in front, a little shorter than the mesonotum and not differentiated into anterior and dorsal surfaces, the dorsal surface rounding into the slightly concave sides. Parapsidal furrows distinct; likewise the suture between scutum and scutellum; postscutellum with small raised median part; metapostnotum linear, exposed except in extreme middle, sunken. Basal $\frac{2}{3}$ of propodeum almost horizontal, apically deeply hollowed medially, the posterolateral angles forming backward-directed vertical ridges, a little less than dentate, yet bluntly projecting.

Wings with three submarginal cells, the second quadrate, nearly equal to third along cubital vein, the second and third cubital crossveins divergent behind; nervulus opposite basal vein, and nervellus in hind wing opposite base of cubital. Upper surface of hind femora with a preapical row of two short spines; apex of hind tibiae with splayed-out spines of different lengths. Claws cleft, the inner ray truncate, except one claw of each front leg in which outer ray is long slender and curved, the inner a large blunt lobe at some distance from the outer. Apex of abdomen slightly compressed; sternite 6 small, with a depression on each side at apex, leaving a median raised ridge; last sternite somewhat depressed, small, with some basal structure that is not clear in the type. Strongly silvery sericeous and with vaguely spotted wings.

Genotype.—*Pompilus connexus* Cresson.

This genus seems to be most closely related to *Ferreoloides* Haupt [18], but the exposed metapostnotum and the short thickened antennae distinguish it.

Dicyrtomalis connexa (Cresson) new combination

1869. *Pompilus* (*Pompilus*) *connexus* Cresson, Proc. Boston Soc. Nat Hist., 12: 369. ♂. Mexico: Orizaba.

The unique holotype is a ♂, not ♀ as stated by Dalle Torre.

Dicyrtomalis confusanea (Cresson) new combination

1869. *Pompilus* (*Pompilus*) *confusaneus* Cresson, Proc. Boston Soc. Nat. Hist., 12: 369. ♂. Mexico: Orizaba.

---

[18] 1929. *Ferreoloides* Haupt, Mitt. Zool. Mus. Berlin, 15: 153.

In this species the posterolateral borders of the propodeum appear to be less produced than in the preceding and are much obscured by copious silvery sericeous pubescence.

Subfamily NOTOCYPHINAE[19]

Labrum exposed and very long, trapeziform; eyes not reniform; pronotum very long, with anterior vertical surface; metapostnotum concealed. Claws all similar, cleft, strongly curved but not bent at right angles; third discoidal cell without a basal pocket; second sternite without a transverse furrow; hind tibiae with a close-set apical fringe of short spines; hind femora of males with one or two pits on the apical part of the upper surface, from which arise short spines.

Haupt[20] erred in referring this subfamily to his "Psammocharidae lisscoscelidae" as may be seen from an examination of the hind femora of the males. The species are believed to be parasites, like those of Ceropalinae, and are clearly derived from Pompilinae.

NOTOCYPHUS Smith

1855. *Notocyphus* Smith, Cat. Hymen. Insects Brit Mus., 3: 172.

Notocyphus albopictus Smith

1862. *Notocyphus albopictus* Smith, Journal of Ent., 1: 398. ♂. Mexico.

I have examined specimens but not the type of this species. In all probability all species described in this genus actually belong there.

Subfamily CEROPALINAE[21]

Labrum exposed but rounded; eyes reniform; pronotum very short and steeply inclined. Third discoidal cell without a basal pocket; second sternite without a transverse furrow; last sternite of ♀ long, compressed, projecting beyond last tergite; apical sternites of ♂ peculiarly modified; apex of hind tibiae with a broken row of short spines; hind femora without spines or spine-pits on upper surface.

CEROPALES Latreille

1796. *Ceropales* Latreille, Prec. Car. Ins., p. 123.

The species described by Cresson in this genus, so far as I have examined them, belong there.

---

[19] Ashmead, Canad. Ent., 1900, 32: 155.

[20] Mitt. Zool. Mus. Berlin, 1930, 16: 674.

[21] Ashmead, Canad. Ent., 1900, 32: 155.

NOTULAE NATURAE

NUMBER 146 OF OCTOBER 25, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NEW PHLOXES FROM THE ROCKY MOUNTAINS AND NEIGHBORING REGIONS

BY EDGAR T. WHERRY

Research Fellow, Department of Botany, The Academy of Natural Sciences of Philadelphia

Three field trips to the Rocky Mountains and vicinity in 1931, 1937 and 1940—the last supported by a grant from the Penrose Fund of the American Philosophical Society—together with extensive herbarium study, have led to the recognition of several novelties in the genus *Phlox*. Except where otherwise noted, the type specimens of those here described are in the herbarium of the Academy of Natural Sciences of Philadelphia. The drawings have been made from herbarium specimens by Miss Leonie Hagerty.

1. A SOUTHERN GREAT PLAINS ENDEMIC

In 1932 Benke[1] reported from northern Oklahoma *Phlox longifolia* Nutt., not previously known east of the Rocky Mountain foothills. Study of his specimens shows them to represent instead an undescribed species. Among eastern Phloxes its nearest relative is apparently *Phlox bifida* Beck, which extends from the Ozark region into eastern Kansas; in its short styles, however, it approaches *P. nivalis* Lodd. ex Sweet, a southeastern species which ranges into eastern Texas. One western *Phlox, P. patula* A. Nels., an endemic of the Rocky Mountain front, is similar in aspect, but has on the average longer leaves, sepals, corolla, and styles.

Specimens were preserved by Mr. Benke from Mooreland, Woodward Co.; it is represented in the herbarium of the Oklahoma Agricultural College from Waynoka, Woods Co., some 20 miles further northeast. It must be a very local plant, for letters sent to a number of botanists in western Oklahoma and surrounding regions inquiring as to its occurrence have failed to elicit a single reply. It may well bear the name of the state to which it seems to be limited.

---

[1] Rhodora, 34: 5-6, 1932.

Phlox oklahomensis new species Figure 1

Plant somewhat shrubby at base, open-tufted, up to 15 cm. high, with subremote nodes and finely pilose internodes. Leaves linear to lanceolate, up to 30 (50) mm. long and 3 (5) mm. wide, thickish, sparsely pilose. Inflorescence few-flowered, the pedicels up to 20 mm. long. Sepals about 10 mm. long, foliaceous, united for half their length, the intersepaline membranes flat or wrinkled, densely pilose, the hairs all glandless or a few gland-tipped. Corolla-tube 10 to 12 mm. long; lobes obovate, 6 to 8 mm. long and 5 to 7 mm. wide, with a terminal notch 0.5 to 1.5 (3) mm. deep. Stamens included. Styles 2 to 3 mm. long, united ½ to ⅔ their length.

Planta inferne suffruticosa, usque ad 15 cm. alta. Folia linearia ad lanceolata, ad 30 mm. longa, 3 (5) mm. lata, crassiuscula, parce pilosa. Inflorescentia parviflora; pedicelli ad 20 mm. longi. Sepala ca. 10 mm. longa, foliacea, dimidio conjuncta, membrana intersepalina plana, dense pilosa. Corollae tubus 10 ad 12 mm. longus; lobi obovati, 6-8 mm. longi, 5-7 mm. lati, emarginati, sinu 0.5-1.5 (3) mm. profundo. Stamina inclusa. Styli 2-3 mm. longi, ½ ad ⅔ longitudinis conjuncti.

TYPE.—Mooreland, Woodward Co., Oklahoma (36-25, 99-25) Benke 5017, April 22. 1929, in herbarium Chicago Museum. A clastotype is in the herbarium of the Academy of Natural Sciences of Philadelphia, and replicate[2] in the Gray Herbarium.

2. THE GENUS *Phlox* IN MEXICO

A number of Phloxes were attributed to subtropical Mexico by Sessé and Mociño,[3] but their descriptions indicate other genera to have been really represented. Only one well-marked species of the genus *Phlox* has thus far been recorded as occurring in that country, in the state of Chihuahua — *P. nana* Nutt. Several infra-specific entities under this were named by Brand (as varieties) those recognized in Mexico being: f. *lutea*, based on Pringle No. 1333; f. *purpurea*, on Pringle No. 1334; and f. *depressa* on Hartman No. 626.[4] Besides *P. nana*, one eastern species has been collected in Mexico in recent years—*P. pilosa* L., in Coahuila and Nuevo León.

---

[2] In some plant groups collectors may consider, or may endeavor to establish, that every specimen to which a given number is attached represents the same species or infra-specific entity. In variable subjects like *Phlox*, however, a single number may get assigned to more than one form, variety, subspecies or even species. Instead of adopting the often-used expression "isotype," therefore, the writer prefers to use a term which carries no implications as to what the collector thought or did: replicate.

[3] Planta Nova Hisp., 25, 1890; Flora Mex., 41, 1893.

[4] *Phlox nana* Nuttall ssp. *eunana* Brand **f. lutea** (Brand) Wherry, status novus; var. *lutea* Brand in Engl. Pflanzenr., IV. 250: 76, 1907; **f. purpurea** (Brand) Wherry, status novus; var. *purpurea* Brand, loc. cit.; ssp. *glabella* (Gray) Brand **f. depressa** (Brand) Wherry, status novus; var. *depressa* Brand, op. cit., 77.

One species remains to be described. Both of the known collections of it are from Durango, which extends the range of the genus south nearly to the Tropic of Cancer.

Phlox mexicana new species Figure 2

Plant with the aspect of *P. nana*, herbaceous perennial, sending up a few slender stems to a height of 25 or 30 cm. Leaves numerous, subopposite, linear, the largest 40 mm. long and 3 mm. wide, sparsely pilose. Inflorescence 3- to 12-flowered, its herbage more or less glandular, the longer pedicels 8 to 25 mm. long. Sepals 10 to 15 mm. long, united somewhat over half their length, the intersepaline membranes flat to wrinkly or obscurely carinate. Corolla-tube about 16 mm. long, glabrous, uniform in width throughout; lobes obovate, about 15 x 10 mm., terminally entire to apiculate. Stamens included. Styles 6 to 8 mm. long, united ⅔ their length.

Planta *P. nana* similis, herbaceo-perennis; caules graciles, 25-30 cm. alti. Folia numerosa, linearia, maximis 40 mm. longis et 3 mm. latis, sparse pilosa. Inflorescentia 3--12-flora, plus minusve glandulosa; pedicelli majores 8-25 mm. longi. Sepala 10-15 mm. longa, magis quam dimidiam conjuncta; membrana intersepalina plana vel corrugata. Corollae tubus ca. 16 mm. longus, glaber; lobi obovati, ca. 15 x 10 mm., apice integri vel apiculati. Stamina inclusa. Styli 6-8 mm. longi, ⅔ longitudinis conjuncti.

TYPE.—Durango, State of Durango, Mexico (24-05, 104-45), F. C. Damm, Sept., 1934. Cotype, same locality, E. W. Nelson No. 4634, Aug. 1, 1898, in U. S. National Herbarium.

The evolutionary relationship of this species deserves brief discussion. Typical *P. nana* as it grows in the southern Rocky Mountains is a plant with shoots 10 to 15 or exceptionally 20 cm. in length, and dense glandular pubescence. Its leaves are opposite and its styles 2 to 3 mm. long. Migrating southward, this evolved into the entity known as ssp. *eunana* f. *purpurea*, which in replicates in American herbaria has shoots 30 cm. long, and moderately glandular pubescence; the leaves are still opposite, but the style-length has increased to 4 mm. In turn this gave rise to *P. mexicana*, with 25 to 30 cm. shoots and sparse glandularity; here the leaves have become subopposite and the styles 6 or even 8 mm. long, at the same time remaining free for 2 to 3 mm. Although the style-length, if considered alone, would lead this species to be placed in a long-styled group, its direct derivation from *P. nana* is so evident that it is here retained in the same group with that.[5]

---

[5] In connection with Mexican Phloxes, it should be noted that the data on Pringle's labels are not very satisfactory. His published journal (Life and Work of Cyrus Guernsey Pringle, Helen Burns Davis, Burlington, Vermont, 1936) shows that No. 1333, labelled " High plains between Cusihuiriachic and Guerrero " was collected near Santiago. By inference from several entries, No. 1334, labelled merely "Foothills of the Sierra Madre," and dated September 10th, is found to have been obtained near a camp about 3 miles south of Guerrero on September 15, 1887.

3. A Southern Rocky Mountain Endemic

In the course of herbarium study of the genus *Phlox*, specimens from southwestern Colorado and adjoining New Mexico were encountered with the aspect of *P. longifolia*, but having the intersepaline membranes essentially flat instead of bulging-carinate as in that widespread species. At the same time, the pubescence is quite glandless, whereas in another excarinate species, *P. viscida*, conspicuous glandularity is present. In 1940 this *Phlox* was found to occur at many points around Pagosa Springs, Colorado, and thence south to the vicinity of Tierra Amarilla, New Mexico. Its attractive carnation-like fragrance, which is unusual in the genus, suggests the epithet here used for the species.

Phlox caryophylla new species Figure 3

Plant shrubby-based, open-tufted, up to 15 (20) cm. high, with more or less remote nodes and pilose internodes; pubescence glandless throughout. Leaves linear, narrow-elliptic, or oblong, more or less falcate, to 50 mm. long and 3 (4) mm. wide, short-acuminate, thickish, glabrate or sparsely pilose. Inflorescence 3- to 12-flowered, the maximum pedicel-length 12 to 25 mm. Sepals 11 to 15 mm. long, united slightly over half their length, the intersepaline membranes flat or wrinkled but not definitely carinate, pilose. Corolla-tube 15 to 17 mm. long, glabrous; lobes narrow-obovate, 7 x 5 to 10 x 7 mm., terminally entire, erose or often shallowly emarginate. Stamens elongate, the anthers of 2 or 3 of them exserted. Styles 8 to 15 mm. long, free for 1 to 1.5 mm. Flowers attractively scented, the limb bright purple to pink, the tube bronzy.

Planta inferne fruticosa, laxe caespitosa, usque ad 15 (20) cm. alta, eglanduloso-pubescens. Folia linearia, anguste elliptica, vel oblonga, breviacuminata, plus minusve falcata, ad 50 mm. longa et 3 (4) mm. lata, crassiuscula, glabrata vel parce pilosa. Inflorescentia 3--12-flora; pedicelli majores 12 ad 25 cm. longi. Sepala 11-15 mm. longa, magis quam dimidiam conjuncta; membrana intersepalina plana vel corrugata vix carinata. Corollae tubus 15-17 mm. longus, glaber; lobi anguste obovati, 7-10 mm. longi, 5-7 mm. lati, apice integri, erosi vel emarginati. Stamina elongata, 2-3 antheris exsertis. Styli 8-15 mm. longi, 1-1.5 mm. liberi. Flores odore caryophylli fragrantes, purpurea vel rosea.

Type.—From sparsely wooded slopes at 7400 feet altitude along U. S. Highway No. 160 (as of 1940), 7 miles by road west-southwest of Pagosa Springs, Archuleta Co., Colorado (37-14, 107-06), Wherry June 5, 1940.

Earlier collections seen comprise: Pagosa Springs, B. H. Smith No. 79, April 1883, in herb. Acad. Nat. Sci. Phila.; gulch below Park View road, N. M., Eggleston No. 6486; Nutritas Cr. bel. Tierra Amarilla, N. M., No. 6630, both April 18-May 25, 1911, in U. S. Nat. Herb.; Pagosa Springs, Lutz No. 4362d, June 22-24, 1919, in Britton Herb.

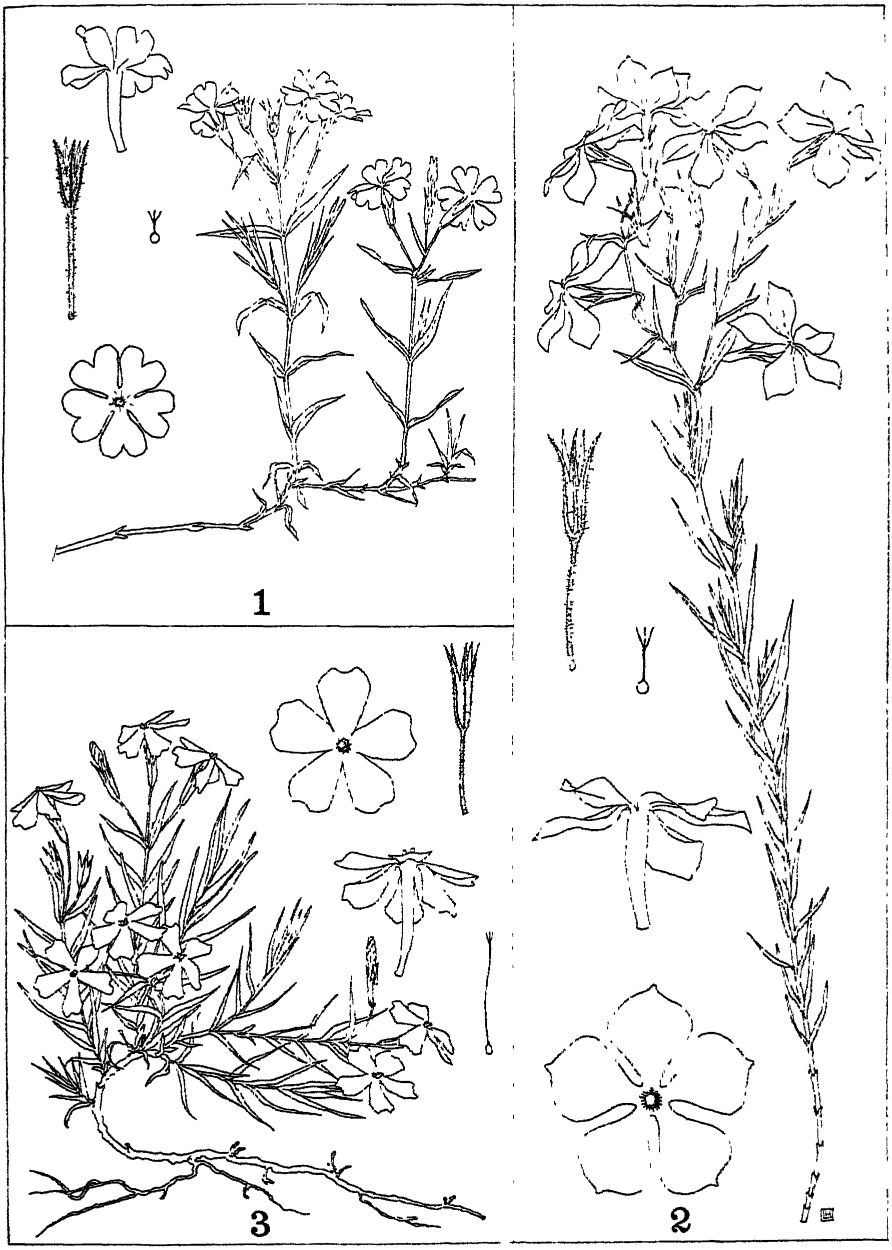
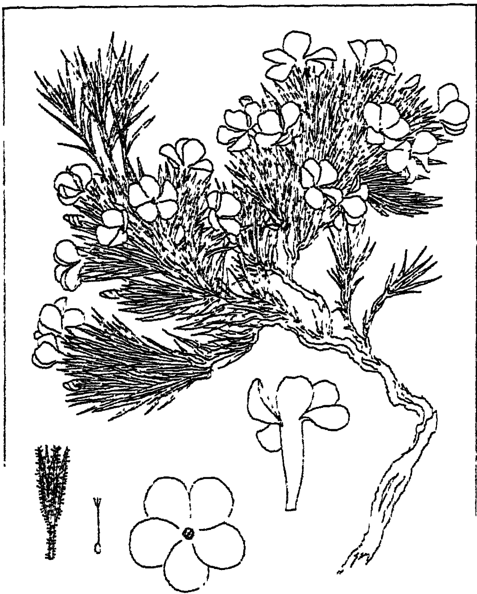
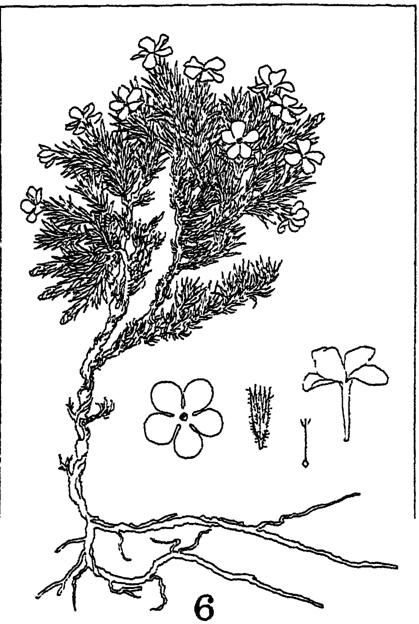


FIG. 1. *P. oklahomensis.*
FIG. 2. *P. mexicana.*
FIG. 3. *P. caryophylla.*

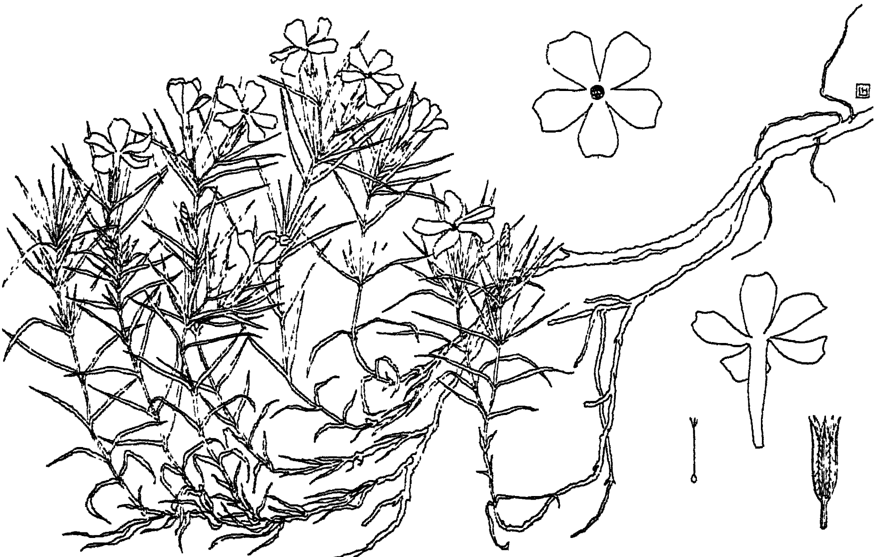
Habit sketches ½ natural size; insets about natural size.



4



6



5

FIG. 4. *P. missoulensis*. FIG. 6. *P. hoodii viscidula*

FIG. 5. *P. jonesii*.

Habit sketches ½ natural size; insets about natural size.

4. A Restricted Endemic in Montana

On the Waterworks Hill at the northeast edge of the town of Missoula, Montana, a dwarf *Phlox* has long been known to occur. It has been distributed to herbaria under various names, but actually lies closest to *P. douglasii* Hook., and I have annotated some sheets of it as a variety of that. Extensive herbarium study having brought to light no intermediates between this entity and typical representatives of *P. douglasii*, its announcement as an independent species seems in order.

Phlox missoulensis new species Figure 4

Plant a diminutive shrublet forming compact mounds up to 10 cm. in height, the internodes rather crowded, densely glandular-pubescent. Leaves dark green, linear-acuminate, somewhat falcate, on drying becoming subacerose, the larger ones 15 to 25 mm. long and 2 mm. wide. Flowers solitary, on pedicels up to 5 (8) mm. long. Sepals 10 to 13 mm. long, united $\frac{2}{5}$ to $\frac{1}{2}$ their length, the intersepaline membranes flat. Corolla-tube 12 mm. long; lobes 7 to 9 mm. long and 4 to 8 mm. wide, entire. Stamens deep-seated. Styles 6 to 7 mm. long, free for 1 mm.

Fruticulus parvus; usque ad 10 cm. altus, dense glanduloso-pubescens. Folia atrovirentia, linearia, acuminata, plusminusve falcata, ad exsiccandum subacerosa, majores 15-25 mm. longa, 2 mm. lata. Flores solitarii; pedicelli majores 5 (8) mm. longi. Sepala 10-13 mm. longa, $\frac{2}{5}$-$\frac{1}{2}$ longitudina conjuncta; membrana intersepalina plana. Corollae tubus 12 mm. longus; lobi 7-9 mm. longi, 4-8 mm. lati, integri. Stamina inclusa. Styli 6-7 mm. longi, 0.5-1 mm. liberi.

By way of contrast it may be noted here that *P. douglasii eudouglasii* Brand, the largest-leaved variant of that species, has subulate leaves up to 10 or rarely 12 mm. long and 1 (1.5) mm. wide, and sepals 8 to 10 mm. long.

Type.—From grass-covered slopes at 3500 feet altitude on Waterworks Hill, Missoula, Missoula Co., Montana (46-53, 113-59), M. J. Reed No. 8, Apr. 28, 1939.

5. The Zion Canyon Phlox

On the rocky slopes of Zion Canyon, Utah, there occurs a *Phlox* which while obviously derived from *P. austromontana* seems sufficiently distinct to justify its independent naming. Its habit is more open than even the most extreme forms of *P. a. prostrata,* while the glabrate bright green leaves are lax and scarcely if at all acerose. The intersepaline membranes bear a medial carina of the same low, sharp-edged type found in the ancestral species; but the styles are decidedly longer, attaining a length of 6 to 10 mm.

This Phlox was first collected by the late Marcus E. Jones, and seems appropriately named in his honor.

Phlox jonesii new species Figure 5

Plant a sprawling shrublet, attaining a height of 25 cm. Leaves linear, up to 30 mm. long and 1.5 mm. wide, lax, bright green, glabrate. Flowers solitary, the pedicels up to 5 mm. long, conspicuously bracted. Sepals 11 mm. long, united for $\frac{3}{5}$ their length, the intersepaline membranes bearing a sharp-edged carina. Corolla-tube 12 to 15 mm. long; lobes 9 to 13 mm. long and 6 to 9 mm. wide. Stamens elongate, the anthers of 1 or 2 exserted. Styles 6 to 10 mm. long, free for 1 to 1.5 mm.

Fruticulus patulus, usque ad 25 cm. altus. Folia linearia, majores 30 mm. longa et 1.5 mm. lata, flaccida, laete viridia, glabrata. Flores solitarii: pedicelli ad 5 mm. longi: bracteae conspicuae. Sepali 11 mm. longi, usque ad $\frac{3}{5}$ longitudinis conjuncti: membrana intersepalina acute carinata. Stamina elongata, 1-2 exserta. Styli 6-10 mm. longi, 1-1.5 mm. liberi.

TYPE—From Zion Canyon, Washington Co., Utah (37-15, 113-00), Marcus E. Jones, May 7, 1923, in U. S. National Herbarium.

6. VARIATION IN THE ALYSSUM-LEAF PHLOX

This characteristic *Phlox* of the eastern Rocky Mountains and adjacent foothills, with pale leaf-margins which dry conspicuously white, was named *P. alyssifolia* by Greene in 1896. Four years later Rydberg proposed a *P. collina*, differing from Greene's plant (which had not yet come to his attention) in only minor respects. In 1894 A. Nelson, also overlooking Greene's article, gave another variant the name *P. abdita*: and two years later proposed *P. sevorsa* for still another. The latter was compared with *P. alyssifolia*, and held to be "notably different," yet the type specimens of the two are essentially indistinguishable. A revision of the classification of this group seems desirable: it is preferably treated as a single species with three subspecies, one divisible into two forms.[6]

---

[6] *Phlox alyssifolia* **vera** Wherry, nomen novum. *P. alyssifolia* Greene, Pittonia, 3: 27, 1896. From the typical form of this is to be distinguished: **f. sevorsa** (A. Nelson) Wherry, status novus. *P. sevorsa* A. Nelson, Univ. Wyo. Publ. Bot., 1: 128, 1926. Differing in the shorter corolla-tube (10 instead of 12 mm. long) but larger lobes (to 10 x 7 mm.)

Phlox alyssifolia **collina** (Rydberg) Wherry, status novus *P. collina* Rydberg, Mem. N. Y. Bot. Gard., 1: 316, 1900.

Phlox alyssifolia **abdita** (A. Nelson) Wherry, status novus. *P. abdita* A. Nelson, Univ. Wyo. Publ. Bot., 1: 47, 1924.

The distinguishing characters of these subspecies are presented in key form on the following page.

KEY TO SUBSPECIES OF *Phlox alyssifolia*

LENGTH OF SHOOTS about 75, largest leaves 25, sepals 12, corolla-tube 15, and styles 11 mm. . . . . a. *abdita*.

LENGTH OF SHOOTS 20 to 60, largest leaves 10 to 20, sepals 8 to 11, corolla-tube 10 to 15, and styles 7 to 11 mm.

- PUBESCENCE more or less glandular; maximum pedicel-length 3 to 12 mm.; range wide . . . . b. *vera*.
- PUBESCENCE glandless; maximum pedicel-length 1 to 4 mm.; endemic in southwestern Montana . . . . c. *collina*.

7. NOMENCLATURE OF THE NORTHERN GREAT PLAINS PHLOX

The common medium-leaved dwarf *Phlox* of the northern Plains and foothills has had a hectic nomenclatorial career. It was first collected in 1820 by Dr. James of the Long Expedition along the Loup Fork of the Platte 2 miles northeast of the present village of Duncan. In reporting upon this collection, Torrey[7] mistakenly identified it as *P. hoodii* Richardson. In May, 1834, Nuttall collected it along the Platte River in what is now western Nebraska, and assigned it a name on a label, though he never published this. Fremont found it in northeastern Colorado in 1842, and Torrey[8] again misidentified it. One of Nuttall's specimens of it came into the possession of Hooker, and he[9] confused it with *P. sibirica* L.

When revising the Polemoniaceae in 1870, Gray[10] pointed out these misinterpretations. Then defining the species *douglasii* in a comprehensive sense, he proposed for the Plains *Phlox* the epithet *P. douglasii* var. *longifolia*, noting that: "One of Nuttall's specimens of this form, named by him *P. andicola*, exhibits, along with flowers having the usual inequality in the stamens, one or two with stamens perfectly equally inserted in the throat of the corolla!"

Thus was supplied a needed epithet; for the plant in question is really not closely related to either *P. douglasii* or *P. longifolia*, between which Gray thought it intermediate. As a distinct species, its name becomes *Phlox andicola* Nuttall ex Gray. The flowers with equal stamens referred to by Gray seem not to represent an entity requiring nomenclatorial recognition, but to be merely immature ones.

---

[7] Ann. Lyc. Nat. Hist. N. Y., 2: 220, 1828.

[8] Rept. Expl. Exped. Rocky Mts., Fremont, 1842: 93, 1845.

[9] J. Bot. & Kew Misc., 3: 290, 1851.

[10] Proc. Amer. Acad. Arts Sci., 8: 254, 1870. In Syn. Fl., 2 (1): 132, 1878 expanded to cover also Pacific coast entities.

Epithet-shifting began in 1894, when Britton[11] made the combination *P. douglasii* var. *andicola;* according to present-day rules, this is superfluous and accordingly illegitimate. Five years later Elias Nelson[12] decided that the plant deserved species status, but apparently felt that Gray's publication of Nuttall's label-epithet was not valid, yet Britton's somehow was; for he gave the authorship " *P. andicola* (Britt.) n. sp." The monographer Brand[13] favored a different status, making the combination "*P. douglasii* ssp. *andicola* (Nutt.) Brand."

In 1924 A. Nelson[14] proposed to call the *Phlox* in question *P. planitiarum,* on the ground that Gray's *P. douglasii longifolia* was being misinterpreted. Nelson stated that " the original segregate from *P. douglasii* is of the mountains," although Gray had given its range primarily as " east of the Rocky Mountains." He further referred to Gray's description of the leaves as " angustissime " overlooking the fact that Gray supplemented this by " vel aceroso-linearibus." And he remarked that had Gray " been dealing with the species of the sandy plains, *P. planitiarum,* he would hardly have omitted reference to the glandulosity in a variety appended to the non-glandular *P. douglasii.*" Actually typical *P. douglasii* is one of the most glandular Phloxes known, whereas only occasional specimens of the sandy plains species are glandular; the fragment in the Gray Herbarium accompanying the Nuttall label is wholly glandless, and so are most replicates of *P. planitiarum.*

The plan here favored is to recognize the Plains *Phlox* as falling into two subspecies. The common, wide-spread glandless one, that represented in all the early collections, may be known as *Phlox andicola typica.* The less common glandular one, which locally forms extensive colonies, may then become *P. andicola planitiarum.*[15]

The distinctions between these entities and *P. douglasii* deserve brief discussion. The Plains Phlox spreads into colonies by rhizomes from which arise separate somewhat dendroid shoots. The herbage is sparse-pubescent below, more copiously so above, the hairs either glandless or gland-tipped. The pale green thickish subacerose leaves may be 20 mm. long and 2 mm. wide. The sepal costae are conspicuous and the intersepaline membranes broad and float. *P. douglasii,* on the other hand, forms compact tufts and mounds, glandular-pubescent throughout. The dark, green thinnish leaves are at most 10 (12) x 1 (1.5) mm. and the sepal costae and membranes inconspicuous.

---

[11] Mem. Torr. Bot. Club, 5: 269, 1894.

[12] Rev. W. N. Am. Phloxes: 11, 1899.

[13] In Engler's Pflanzenreich, IV. 250: 85, 1907.

[14] Univ. Wyo. Publ. Bot., 1: 49, 1924.

[15] *Phlox andicola* **typica** Wherry, nomen novum. *P. andicola* Nuttall ex Gray, Proc. Amer. Acad. Arts Sci., 8: 254, 1870. *P. andicola* **planitiarum** (A. Nelson) Wherry, status novus. *P. planitiarum* A. Nels. loc. cit.

8. A Variant of the Sageland Phlox

In all of the subspecies of *P. hoodii* thus far recognized the pubescence is glandless. Occasional specimens from the northern Great Plains, however, have some of the hairs gland-tipped. In this respect they approach *P. caespitosa,* and have in the past been confused with that; but their leaves are thinner and narrower than in that species. This variant may be designated:

Phlox hoodii viscidula new subspecies Figure 6

Plant similar to *P. hoodii genuina,* but besides having the hairs in part gland-tipped, averaging larger in certain respects: clumps to 7 cm. high; length of larger leaves 6 to 10 mm., of pedicels 1 to 4 mm., of sepals 6.5 to 7.5 mm. and of styles 4 to 6 mm.

Planta *P. hoodii genuina* similis, sed pili plus-minusve glandulosi; longitudo foliorum 6-10 mm., pedicellorum 1-4 mm., sepalorum 6.5-7.5 mm., et stylorum 4-6 mm.

Type.—Five miles west of Drummond, Granite Co., Montana (46-40, 113-15), F. H. Rose, No. 10, May 4, 1938.

Known in Montana also from Bozeman Pass (45-43, 110-59); and in Alberta, Canada, from Calgary (51-00, 114-00) and Morley (51-05, 114-55).

9. Hybrid Phloxes from the Great Plains-Black Hills

Mr. Claude A. Barr has kindly called my attention to three Phloxes which combine the characters of pairs of species:

A. *Phlox andicola* X *P. hoodii glabrata.*—Leaves glabrate, numerous, linear-subulate, the larger 10 to 12 mm. long and 0.75 to 1 mm. wide; sepals strongly costate, about 7 mm. long; corolla-tube about 10 and styles 6 mm. long. Typified by specimen from Cheyenne Bluffs at 43-21, 103-25, Fall River Co., South Dakota, C. A. Barr 38-3, May 12, 1938.

B. *Phlox alyssifolia* X *andicola.*—Leaves linear, thickish with pale margins, to 15 x 2 mm.; sepals about 10 mm. long, glandular; corolla tube about 11 and styles 9 mm. long. Typified by specimen from Cheyenne Bluffs at 43-20½, 103-25, Fall River Co., South Dakota, Wherry June 8, 1937.

C. *Phlox alyssifolia* X *hoodii glabrata.*—Leaves numerous, linear-subulate, thickish with pale margins, to 12 x 1.5 mm.; inflorescence 1 to 2-flowered, glandular; pedicels 5 to 10 mm. long; sepals about 8 mm. long, herbaceous with low costae; corolla tube about 8 and styles 7 mm. long. Typified by specimen from Reeves canyon north of Wind Cave National Park, 43-37, 103-29, Custer Co., South Dakota, C. A. Barr 39-25, May 6, 1939.

NOTULAE NATURAE

NUMBER 147 OF NOVEMBER 10, 1944

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

SOME CHILOPODS FROM THE INDO-AUSTRALIAN ARCHIPELAGO

BY RALPH V. CHAMBERLIN
University of Utah

In this paper are listed the species of chilopods represented, for the most part, in a collection from New Guinea, Java, Sumatra and smaller adjacent islands, transmitted to me some years ago by Dr. K. W. Dammerman of the Buitenzorg Museum. The entire collection, including all types, is at present in the Academy of Natural Sciences of Philadelphia.

CRYPTOPIDAE

Cryptops doriae Pocock

Cryptops doriae Pocock, Ann. Mus. Civ. Genova, 1891, vol. 31, p. 421.

JAVA SEA: Wachler Island, taken October 21, 1921, by Dammerman.

JAVA: Tjibodas, three specimens taken in May, 1922, by the same collector.

Cryptops stabilis new species

Related to *C. modigliani* Silvestri, of Sumatra, but a smaller form distinct in having no ventral spine at distal end of patella of anal legs. First dorsal plate overlapping caudal border of head, without either transverse or longitudinal sulci. Median sulci absent also from other tergites as in *modigliani*. Anterior margin of prosternum widely convex on each side, the two halves meeting at middle in a very obtuse re-entrant angle. Anal legs with third and fourth joints simply setose beneath and without a naked area; these joints notched at distal end above; bearing no teeth. Tibia of anal legs with a series of six teeth beneath, the first tarsal joint with three teeth

Head and first dorsal plate and last tergite yellow or orange, the remaining portion of body dark.

Length, 10 mm.

Type—Goenoeng Malabar, Java, December, 1920. Only specimen seen.

Otocryptops melanostomus (Newport)

Scolopocryptops melanostoma Newport, Trans. Linn. Soc. London, 1845, vol. 19, p. 406.
Otocryptops melanostoma Pocock, Journ. Linn. Soc. London, 1891, vol. 24, p. 464.

DUTCH NEW GUINEA: Doormanpad, elevation 2000-2900 meters, October 30, 1920, coll. by W. C. Van Heurn; Pionierbivak, June-August, 1920, coll. by W. C. Van Heurn.

OTOSTIGMIDAE

Otostigmus punctiventer (Tomosvary)

Branchiotrema punctiventer Tomosvary, Term. Fuz., 1885, vol. 9, p. 66.
Otostigmus punctiventer Pocock, in Willey's Reisen, 1898, vol 1, p. 61.

DUTCH NEW GUINEA: Doormanpad, October, 1920, W. C. Van Heurn; Pionierbivak, 1920, W. C. Van Heurn; Bataviabivak, August 25, 1920, W. C. Van Heurn.

SUMATRA: Lampongs, Wai Lima, November-December, 1921, coll. Karny and Siebers.

Otostigmus spinosus (Porath)

Otostigmus spinosus Porath, Bih. K. Sv. Vet Ak. Handl., 1876, IV, no. 7, p. 22.

SUMATRA: Lampongs, Wai Lima, November-December, 1921, coll. Karny and Siebers.

SUNDA STRAIT: Sebesi Island, October 29, 1920, coll. Dammerman.

JAVA: Goenoeng Malabar, elevation, 1600 meters, December, 1920.

Otostigmus astenus (Kohlrausch)

Branchiotrema astenus Kohlrausch, Arch. f. Naturg., 1887, vol. 47, p. 72.
Otostigmus astenus Kraepelin, Rev. der Scolopendriden, 1903, p. 114.

NORTH DUTCH NEW GUINEA, one specimen, January 17, 1916.

Otostigmus metallicus Haase

Otostigma metallicum Haase, Abh. Mus. Dresden, vol. 5, p. 70.
Otostigmus metallicus Kraepelin, Rev. der Scolopendriden, 1903, p. 121, fig. 58.

SUMATRA: Lampongs, January, 1922, two specimens.

Otostigmus dammermani new species

A small form close in general structure to *O. splendens* Pocock of India (Madras), but differing in having the prosternal teeth 3 + 3 instead of 4 + 4 and the margining of tergites beginning on segment 12 instead of 8. Antennae composed of 18 articles. Prosternal teeth 3 + 3, of which the two innermost on each side are fused well toward their apices. Ventral plates with paired sulci absent or only over anterior border. Last ventral plate narrowed caudad, with the caudal margin widely curved. Only a few of the anterior legs with two tarsal spines. Femora of anal legs beneath with three outer spines and two inner ones, in addition to four on mesal surface and one at distal corner above.

Length, about 20 mm.

Type.—Depak. Taken October 10, 1920, by Dammerman. Only specimen seen.

Ostostigmus loriae (Silvestri)

Otostigma loriae Silvestri, Ann. Mus. Civ. Genova, 1894, vol. 39, p. 627.
Otostigmus loriae Kraepelin, Rev. der Scolopendriden, 1903, p. 117.

Dutch New Guinea: Pionierbivak.

Otostigmus telus Chamberlin

Otostigmus telus Chamberlin, Bull. Univ. of Utah, Biol. Series, vol. 5, no. 2, p. 4.

Dutch New Guinea: Pionierbivak. One specimen taken June-August, 1920, by Dr. Van Heurn.

Ethmostigmus platycephalus (Newport)

Heterostoma platycephala Newport, Trans. Linn. Soc. London, 1845, vol. 19, p. 415.
Ethmostigmus platycephalus Kraepelin, Rev. Scolopendriden, 1903, p. 162.

Dutch New Guinea: Bivak Holsin, March 5, 1910; Prauvenbir; Swaust Valley, November, 1920; Doormanpad, October, 1920.

Ethmostigmus platycephalus loriae (Silvestri)

Heterostoma loriae Silvestri, Ann. Mus. Civ. Genova, 1894, vol. 34, p. 631.

Dutch New Guinea: near Mamberano and Identburg Rivers.

Ethmostigmus rubripes (Brandt)

Scolopendra rubripes Brandt, Bull. sc. Ac. Petersbourg, 1840, vol. 7, p. 156.
Ethmostigmus rubripes Kraepelin, Rev. Scolopendriden, 1903, p. 161.

Dutch New Guinea: Pionierbivak, Mamberana River, December, 1921, coll. W. C. Van Heurn.

Ethmostigmus spinosus nannus Chamberlin

Ethmostigmus spinosus nannus Chamberlin, Bull. Univ. of Utah, Biol. Series, vol. 5, no. 2, p. 5

Dutch New Guinea: Doormanpad, elevation 1410 meters. Two specimens taken in October, 1920 by Van Heurn.

Ethmostigmus telior Chamberlin

Ethmostigmus telior Chamberlin, Bull. Univ. of Utah, Biol. Series, vol. 5, no. 2, p. 5.

Dutch New Guinea: Pionierbivak, June-August, 1920. One specimen taken by Dr. Van Heurn.

Ethmostigmus relictus new species

Suggesting *E. rubripes* in the form of the pseudopleural process which is similar in having two distal spines but differs in having but two spines above with these low and blunt, almost abortive. It differs also in lacking a tarsal spine on the twentieth pair of legs. Dorsum chestnut brown with a green band across posterior border of each typical tergite. Legs light or yellowish brown. Antennae composed of 20 segments. Prosternal teeth three on each side. Submarginal dorsal sulci beginning on fourth segment. Last ventral plate without median sulcus, narrowed caudad as usual, with caudal corners rounded and caudal margin mesally incurved. Femur of the anal legs ventrally with two outer spines and two inner ones, and on mesal surface with four spines; spine at distal end above of normal size.

Length, about 75 mm.

Type.—"Luid", Dutch New Guinea. Collected by Dumas in 1909. Only specimen seen.

SCOLOPENDRIDAE

Scolopendra morsitans Linne

Scolopendra morsitans Linne, Syst. Nat., ed. 10, p. 638.

JAVA: Batavia Bay, Purmerend. November, 1919; Edam, November, 1919, many young specimens.

NORTH DUTCH NEW GUINEA: January 17, 1916.

Scolopendra subspinipes Leach

Scolopendra subspinipes Leach, Trans. Linn. Soc. London, 1814-15, vol. 11, p. 383.

DUTCH NEW GUINEA: Prauvenbir, November, 1920, coll. W. C. Van Heurn; Doormanpad, October, 1920, coll. W. C. Van Heurn; Pionierbivak, Mamberano River, December, 1921, W. C. Van Heurn coll. Bali.

SUNDA STRAIT: Krakatau, September and December, 1919, Dammerman coll.

JAVA: Buitenzorg, June 24, 1921, coll. Driesmann; Hoorn Islands, Batavia Bay.

Scolopendra subspinipes dehaani Brandt

Scolopendra de Haani Brandt, Bull. Ac. Petersbourg, 1840, vol. 7, p. 152.
Scolopendra subspinipes dehaani Kraepelin, Rev. Scolop., 1903, p. 260.

SUMATRA: Lampongs, Wai Lima, 1921, coll. Karny and Siebers.

SCHENDYLIDAE

Eucratonyx hamatus Pocock

Eucratonyx hamatus Pocock, Willey's Zool. results, 1898, pt. 1, p. 66, pl. 6, fig. 2c.

DUTCH NEW GUINEA: Bataviabivak, August 25, 1920, coll. W. C. Van Heurn.

BALLOPHILIDAE

Ballophilus conservatus new species

Pairs of legs, 69. Head small, about as wide as long, anteriorly rounded. Basal plate but little shorter than the succeeding tergite. Antennae strongly geniculate near middle with distal portion clavately enlarged as usual; terminal article distally rounded. Prehensors small, the claws when closed far from reaching anterior margin of head. Ventral pores in the usual dark-colored, transversely elliptical area, present on sternites from second to third-from-last inclusive. Last ventral plate broadly trapeziform. Coxopleural pits two on each side, of which posterior one is very large and free, the anterior smaller. Anal legs strongly thickened. Anal pores lacking.

Length, about 15 mm.

Type.—Goenoeng Malabar, Java, elevation 1600 meters, December, 1920. Only specimen seen.

Resembling the South African *B. braunsi* Silvestri but pairs of legs more numerous, the last sternite broader and the coxal pores larger and unequal.

Ballophilus pedadanus new species Figure 1.

In general features apparently near *B. sabesinus* with which it agrees in having ventral pores lacking on the last four sternites and in having two large coxal pits on each side. It seems to differ clearly in the form of the antennae which are more evenly and moderately curved at middle, not truly geniculate, and especially in the more strongly flattened and expanded distal portion in which the apical article is more conically narrowed distad as shown in figs. 1 and 2. Pairs of legs in male holotype, 51.

Length, about 13 mm.

Type.—♂; Pedada B[ay], Lampongs, Sumatra, January, 1922. Only specimen seen.

Ballophilus sabesinus new species Figure 2.

At present the preserved type is, in general, fulvous in color with violet areas embracing or beneath the poriferous regions of the sternites. The constriction of body behind head conspicuous. Head wider than long. Antennae clavate, distally flattened, strongly geniculate or bent into a narrow v at middle. Prehensors of the usual form. Ventral pores occurring in sternites from the second to the fifth-from-last; i. e., the sternita of the last four pediferous somites lack pores. Coxal pits large, two on each side. Last ventral plate trapeziform, strongly narrowing caudad. Anal legs of male conspicuously crassate, conically narrowed distad. Pairs of legs, 53.

Length, about 14 mm.

Type.—♂; Sebesi Island, Sunda Strait, elevation, 700 meters, April 25, 1921. Poentbjak, August 5, 1920, one male with 49 pairs of legs is referred tentatively to the same species.

Resembles the African *B. alluaudi* in number of pairs of legs, but differs, e. g., in having the head clearly wider than long, instead of equal in length and breadth.

ORYIDAE

Orphnaeus brevilabiatus (Newport)

Geophilus brevilabiatus Newport, Trans. Linn. Soc. London, 1844, vol. 19, p. 436.
Orphnaeus brevilabiatus Pocock, Weber's Reise, 1894, vol. 3, p. 317.

JAVA: Buitenzorg; Batavia Bay, February, 1919 (Hoorn).

SUMATRA: Lake Toba, March, 1922.

Endoptelus papuicolens Chamberlin

Endoptelus papuicolens Chamberlin, Bull. Univ. of Utah, Biol. Series, vol. 5, no. 2, p. 7.

DUTCH NEW GUINEA: Pionierbivak, June-August, 1920, Dr. Van Heurn, coll.

MECISTOCEPHALIDAE

Anarrup malabarus new species Figure 3.

Readily distinguished from *A. nesiotes*, the genotype occurring in south Celebes, in the very different form of the cephalic plate as represented in fig. 3, and in having 45 pairs of legs as against 41 in *nesiotes*. About ten subseriate setae on anterior part of non-areolated chypeal area. Median piece of labrum with caudal end triangular, in front of the triangular portion trapeziform with anterior end narrowest. Lateral pieces with caudal margin convex mesally and concave toward ectal end. Non-areolated portion of clypeus extending forward to anterior margin at middle, where it narrows to a point. A moderately long and broad areolated area on each side adjacent to antennal socket and lateral margin.

Ectal side of coxa of each first maxilla straight, continuing the line of the palpus, the cephaloectal corner of the coxa not broadly rounded as it is in *nesiotes*. Anterior margin of prosternum with two broad, narrowly separated teeth. Femuroid of prehensor with an acute, distally-directed tooth at distal end; other joints unarmed, in this respect also differing from *nesiotes*. Sternal impressions deep, linear, not anteriorly furcate. Last sternite strongly narrowed caudad. Coxal pores small, numerous. Pairs of legs, 45.

Length, near 17 mm.

Type.—Goenoeng Malabar, Java, elevation 1000 meters, December, 1920. A paratype bears the same data as the type.

Mecistocephalus magister Chamberlin

Mecistocephalus magister Chamberlin, Bull. Univ. of Utah, Biol. Series, vol. 5, no. 2, p. 8, figs. 3-6.

DUTCH NEW GUINEA: Doormanpad. October, 1920, several adults and many partly grown. W. C. Van Heurn.

Mecistocephalus enigmus new species Figures 4-6.

The body in general yellowish, largely marked with a characteristic mottling and reticulation of a darker pigment; head and prehensors somewhat ferruginous. Head widest across anterior end and conspicuously narrowed caudad as shown in fig. 4. Labrum of form shown in fig. 5. Number of lamellae of mandibles uncertain, but as nearly as can be made out from the single preparation, the number is 9 or 10. Teeth of a median lamella long over distal portion with a few shorter over a point proximad of these. First lamella and angle beneath it as shown in fig. 6.

Two teeth on prosternal margin low and pale. Femuroid of prehensors with two teeth of which the more proximal one is much smaller than the distal; next joint with the tooth obsolete; tooth of next well developed, distally rounded; tooth at base of claw, low and broad. Longitudinal sulcus on sternites deeply impressed, furcate at anterior end, but the branches short and weak, the angle between them acute. Last sternite trapeziform, rather narrower than usual. Coxal pores small, comparatively few. Pairs of legs, 49.

Length, about 20 mm.

Type.—*Poentjak,* August 5, 1920. A paratype bears the same data as the type.

In teeth of prehensors suggesting *M. zygethus,* but the latter has 51 pairs of legs and differs in other details.

Mecistocephalus spissus Wood

Mecistocephalus spissus Wood, Journ. Acad. Nat. Sci. Phila., 1862, ser. 2, v. 5, p. 43.

JAVA: Pangrango, elevation 2000 meters. One specimen taken in August, 1921; also Tjibodas, Java, elevation 1400 meters August, 1921, one taken by Dr. Dammerman.

Mecistocephalus leioplus new species Figures 7-9.

This species is most readily distinguished from others of the region in the almost edentulous condition of the prehensors. In these the prosternum presents anteriorly, at best, rudiments of slight teeth; the femuroid has only a single weak tooth at distal end; the next joint lacks a tooth and the following one has a small one; claw without distinct tooth at base. See further fig. 9. The form of the head plate is shown in fig. 7, and relations of middle and side pieces of labrum in fig. 8. Anterior branches of sternal impressions weak, meeting at an acute angle. Coxal pores moderately numerous. Pairs of legs, 49.

Length, about 18 mm.

Type.—Kombuis Island, Java Sea, November 11, 1920. Only specimen seen.

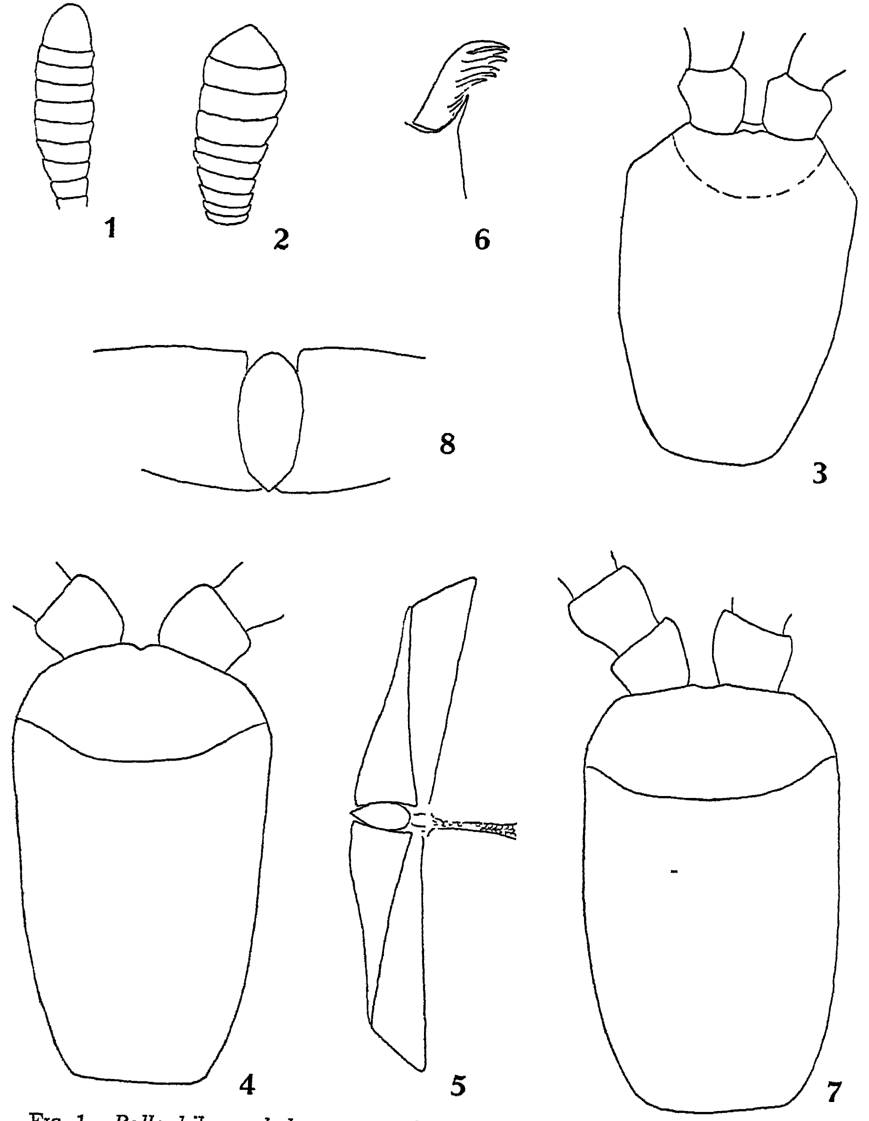


FIG. 1.—*Ballophilus pedadanus*, n. sp. Distal portion of antenna, dorsal view. FIG. 2. *Ballophilus sabesinus*, n. sp. Distal portion of antenna, dorsal view. FIG. 3. *Anarrup malabarus*, n. sp. Head in outline. FIG. 4. *Mecistocephalus enigmus*, n. sp. Head in outline. FIG. 5. The same. Labrum. FIG. 6. The same. First pectinate lamella of mandible. FIG. 7. *Mecistocephalus leioplus*, n. sp. Head in outline. FIG. 8. The same. Middle portion of labrum.

Mecistocephalus stenoceps new species Figures 10-12.

This species seems to be most readily distinguished by the unusually narrow cephalic plate in which the sides converge caudad but little except toward caudal end as shown in fig. 10, much as *M. vanheurni.* The anterior, areolated area of the clypeus decidedly longer anterocaudally than the posterior non-areolated band; a submedian pair of setae on posterior part of areolated band and a series of three setae in a transverse row on each side farther forward. Labrum having the general form of that in *krakataunus* but the median piece broader as shown in fig. 11. Form of the first lamella of the mandible as shown in fig. 12.

Prosternum with two slight subconical teeth which are pale in color. Femuroid of prehensors with two small rounded teeth, each subsequent joint with a single, similarly rounded tooth, all teeth brown in color rather than black. Pregenital sternite strongly narrowed caudad, the posterior end rather narrowly rounded. Coxal pores small and numerous above and laterally as well as beneath. Pairs of legs, 49.

Length, about 25 mm.

JAVA.—Purmerend, Batavia Bay, November, 1919; a paratype also bears the same data as the type; Batavia, March, 1921, three specimens.

Probably nearest to *M. vanheurni* from which it is distinguished in character of teeth of prehensors and prosternum and in details of labrum.

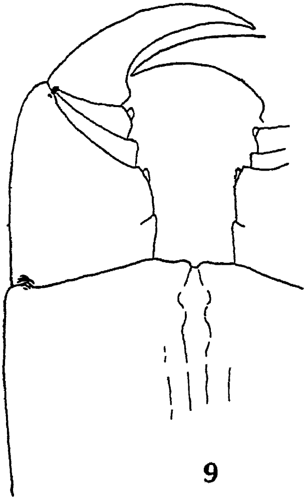
Mecistocephalus krakataunus new species Figures 13, 14.

Evidently close to *M. castaneiceps* Haase, as far as can be judged from Haase's inadequate description, but seems to be differentiated in having two distinct teeth on the anterior margin instead of having that margin smooth and evenly concave. Head and prehensors dusky brown to light chestnut, body more yellow. Form of cephalic plate as shown in fig. 13. Punctae on cephalic plate less coarse and regular than represented for *castaneiceps.* Labrum with caudal margin of lateral pieces smooth, mesally convex, and the median piece characteristically narrow, as shown in fig. 14. Outer shoulder of coxa of first maxilla moderately wide, with a low, rounded prominence at outer angle. Strongly contrasting with *M. tahitiensis* in the much longer palpi of the second maxillae which extends much beyond the first maxillae, bending in well in front of the latter; setae of terminal joint numerous.

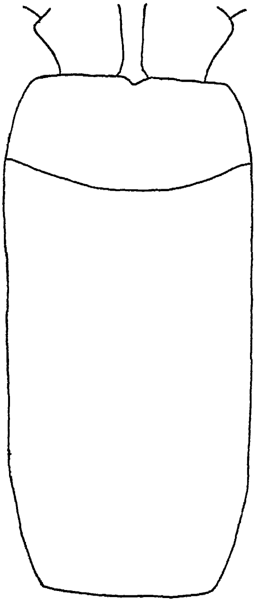
Prosternum anteriorly with two distinct, broadly subconical teeth. Femuroid of prehensors with two teeth, each other article with a single tooth. Sternal impressions simple, anteriorly unbranched as in *tahitiensis.* Coxal pores numerous but well spaced from each other, moderate and small in size. Pairs of legs, 47.

Length, about 33 mm.

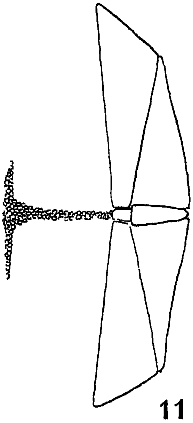
Type.—Krakatau, Sunda Strait, April, 1920; a paratype also bears the same data as the type. Batavia, Java; March, 1920, one specimen.



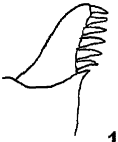
9



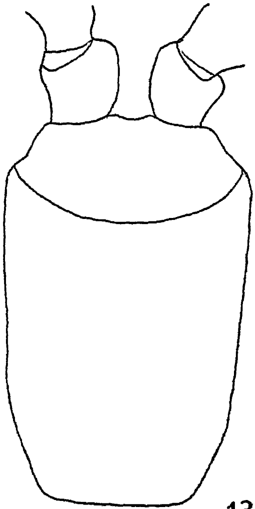
10



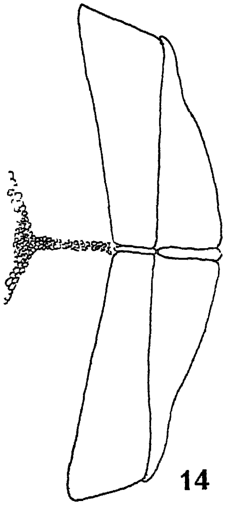
11



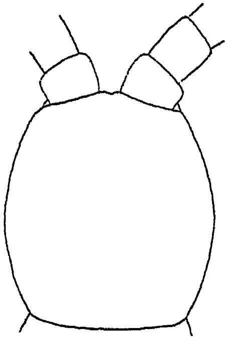
12



13



14



15

Fig. 9.—*Mecistocephalus leioplus*, n. sp. Portion of prehensors, ventral view. Fig. 10. *M. stenoceps* n. sp. Head in outline. Fig. 11. The same. Labrum. Fig. 12. The same. First pectinate lamella of mandible Fig. 13. *M. krakataunus*, n. sp. Head in outline. Fig. 14. The same. Labrum. Fig. 15. *Javaenia bataviana*, n. sp. Head in outline. Dorsal.

Mecistocephalus vanheurni Chamberlin

Mecistocephalus vanheurni Chamberlin, Bull. Univ. of Utah, Biol. Series, vol. 5, no. 2, p. 9, figs. 17-19, 1939.

Dutch New Guinea: Doormanpad, elevation 1800-2400 meters. Four adults taken by W. C. Van Heurn, October 27-30, 1920.

Mecistocephalus zygethus Chamberlin

Mecistocephalus zygethus Chamberlin, Bull. Univ. of Utah, Biol. Series, vol. 5, no. 2, p. 10, figs. 13-15, 1939.

Dutch New Guinea: Doormanpad, elevation 1800-2400 meters, October 27-30, 1920. Three specimens. W. C. Van Heurn, coll.

Dasyptyx eupistus Chamberlin

Dasyptyx eupistus Chamberlin, Bull. Univ. of Utah, Biol. Series, vol. 5, no. 2, p. 10, figs. 7-9 and pl. 11, fig. 16, 1939.

Dutch New Guinea: Pionierbivak. June-August, 1920. Two specimens collected by Dr. Van Heurn.

Dasyptyx pseustes Chamberlin

Dasyptyx pseustes Chamberlin, Bull. Univ. of Utah, Biol. Series, vol. 5, no. 2, p. 11, pl. 2, figs. 10-12, 1939.

Dutch New Guinea: Prauwenbivak. November, 1920. Two specimens of which one lacks the head end. Van Heurn.

LINOTAENIIDAE

JAVAENIA new genus

In general form and structure apparently allied to *Linotaenia*. Head proportionately small, lacking frontal suture. Antennae subfiliform, moderately attenuated distad. Labrum with median piece much enlarged as in *Linotaenia*, with anterior margin fringed or toothed. First maxillae without lappets. Second maxillae with coxae essentially separated, or but narrowly connected at middle. Prehensors small, covered by head. Prosternum lacking chitinous lines. Ventral pores present on posterior portion of sternites, the area not sharply set off. Last ventral plate broad. Coxal pores clustered and opening into a single pit or depression on each side. Anal pores present.

Genotype.—Javaenia bataviana, new species.

Differing from *Linotaenia* and related genera in the separated coxae of the second maxillae and the clustered coxal glands opening into a larger pit on each side, as well as in the minute size of tooth on claw of prehensors.

Javaenia bataviana new species Figure 15.

General color yellow. Body widest in middle region, conspicuously narrowed cephalad and caudad. Head small, of form and proportions shown in fig. 15. No frontal suture present. Prebasal plate not explored. Claws of prehensors when closed not attaining front margin of head. Claws of prehensors armed at base with a small tooth, the other joints and the prosternum unarmed. Spiracles circular. Last ventral plate very broad, posteriorly rounded. Coxal pores several, opening into a depression or pit on each side. Anal legs in female slender, in male moderately crassate; claws well developed. Pairs of legs in female, 43-45; in male 41.

Length, about 15 mm.

Type.—♂; Batavia, Java, March, 1920. A paratypic male and female bearing the same data as the type have also been examined.

LITHOBIIDAE

Australobius ethodes Chamberlin

Australobius ethodes Chamberlin, Bull. Univ. of Utah, Biol. Series, vol. 5, no. 2, p. 12, 1939.

DUTCH NEW GUINEA: Doormanpad, elevation, 1800-2400 meters. One male taken by W. C. Van Heurn, October 27-30, 1920.

Australobius malabarus new species

Differing from *A. scabrior*, the genotype, in having the antennae composed of 20 articles instead of 21-22. Eyes consisting, in the type, of six ocelli arranged thus: 1 + 3, 2. Of these ocelli the most caudal one of the upper series is much larger than the others and is also somewhat larger than the single ocellus, in this respect differing from *scabrior*. Prosternal teeth 4 + 4 or 5 + 5, even, with the prosternal margin ectad of the teeth on each side rounded about the corner and bearing the special seta. Posterior angles of 9th, 11th and 13th dorsal plates distinctly produced, but the processes small. Dorsal surface of tergites margined and roughened much as in *scabrior*. Coxal pores 3, 4, 4, 4.

Fifteenth legs missing from types. First legs with ventral spines 0, 0, 0, 0, 1. The following legs have tibia with a single dorsal spine and a much stouter ventral one. Last pair of coxae dorsally armed, the others unarmed. Penultimate legs each bearing two distinct claws; dorsal spines, 0, 0, 3, 1, 0. Dorsal spines of thirteenth legs, 0, 0, 3, 1, 1.

Length, about 11 mm.

Type.—♂; Goenoeng Malabar, Java, elevation 1600 meters, December, 1920. A paratypic male and one partly grown specimen have also been examined.

Australobius (Javobius) auctus new subgenus and new species

Differing from previously described species of *Australobius* in having the posterior angles of the sixth and seventh, as well as those of the 9th, 11th, and 13th dorsal plates produced and on this basis placed in a separate subgenus. The processes of these plates are short but distinct except on seventh plate where they are especially weak. Dorsal surface of tergites rugose and in part scabrous.

Antennae composed of 20 articles. Eyes composed of few ocelli arranged in two series; e. g.; 1 + 3, 2; first ocellus of top series largest, much exceeding the single ocellus which is not separated by a space from the others. Prosternal teeth 7 + 7, the teeth on each side toward mesal line larger and more widely spaced than the more ectal ones. Coxal pores, 2, 3, 3, 3. First legs with no ventral spines; dorsal spines, 0, 0, 0, 0, 1. Ventral spines of 13th legs, 0, 0, 2, 3 and (1), 1; dorsal 0, 0, 3, 2, 2. (Last two pairs of legs missing from type.) None of posterior coxae armed dorsally, the last pair armed laterally.

Length, 10 mm.

Type.— ♂ ; Pangrango, Java, elevation 2000 meters, August, 1921. Only specimen seen.

Onebius pangrangonus new species

Antennae short, composed of 19 articles. Ocelli small, five in number, arranged in two series—3, 2; the middle ocellus of upper series largest, the posterior one smallest, not differentialised at a single ocellus. Prosternal teeth 2 + 2, the median sinus nearly v-shaped; teeth acute, not united by a sclerotized basal band. Coxal pores on last four pairs of coxae circular, uniseriate, few in number. Ventral spines of first legs, 0, 0, 0, 0, 1; these legs dorsally unarmed. Ventral spines of anal legs 0, 1, 3(2), 2, 0; dorsal 0, 0, 2, 0, 0; claw single. Ventral spines of penultimate legs, 0, 1, 2, 1, 0; dorsal, 0, 0, 2, 0, 0; claw at base with a minute accessory claw and spine. Ventral spines of 13th legs, 0, 0, 1, 1, 1. Anal legs in male evenly and moderately inflated.

Length, 5.5 mm.

Type.— ♂ ; Pangrango, Java, elevation 3000 meters, August 1921. Only specimen seen.

Differing from *O. moananus*, the genotype, known from Ocean Island, in having the antennae with 19 instead of 20 articles, and in apparently lacking dorsal spines on the last two pairs of coxae.

BURMOBIUS new genus

Antennae short, composed of 20 articles. Ocelli seriate, few in number; e. g., 1 + 3, 2. Prosternal teeth numerous, with a diastema on each side separating several outer teeth from the more mesal series, the special spine lying in or just caudad of the diastem; e. g., 4 + 4 — 4 + 4. Gonopods of female strictly entire with basal spine, in genotype 4 + 4. Several pairs of posterior coxae armed laterally and dorsally, but none armed ventrally.

Genotype.—Burmobius feae (Pocock).

The genotype, described originally from Burma, suggests the North American *Zinapolys* in the entire claw of the female gonopods with the numerous basal spines. It is readily distinguished, however, in lacking ventral spines on the posterior coxae, in the small number of ocelli, and especially in the presence of the diastema in the prosternal dental series on each side and in the position of the special prosternal seta.

SCUTIGERIDAE

Thereuopoda clunifera (Wood)

Cermatia clunifera Wood, Journ. Acad. Nat. Sci. Phila., 1862, ser. 2, vol. 5, p. 10.

Thereuopoda clunifera Verhoeff, Sitzungs-Ber. der Ges. naturf. Freunde, 1904, no. 10, p. 275.

JAVA: Batavia, November, 1918, coll. Schouten; Buitenzorg, March 5, 1920, coll. Van Heurn, and September 3, 1920, coll. J. Lang.

NOTULAE NATURAE

NUMBER 148 OF MARCH 9, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

ADDITIONAL NOTES ON WEST INDIAN BIRDS.[1]

BY JAMES BOND

Associate Curator of Birds, The Academy of Natural Sciences of Philadelphia

The following notes on birds known from the West Indies will serve to supplement or modify information contained in the second edition of my "Check-List of West Indian Birds" (Academy of Natural Sciences, 1945).

Anas fulvigula rubripes Brewster

There is only one definite record of the black duck from the West Indies, that of Ventura Barnés, who received an adult male "*Anas rubripes rubripes*" that had been shot at Guanica Lagoon, Puerto Rico, on December 28, 1935 (Auk, vol. 53, 1936, pp. 350, 351). On page 15 of my Check-list (1945) I referred to this record under "*Anas rubripes,*" but should have used the trinomial, following the Check-List of North American Birds (1931).

However, examination of North American black ducks indicates that one rather than three species should be recognized. The races would stand as follows:

Anas fulvigula novimexicana Huber
Anas fulvigula diazi Ridgway
Anas fulvigula maculosa Sennett
Anas fulvigula fulvigula Ridgway
? *Anas fulvigula tristis* Brewster
Anas fulvigula rubripes Brewster

The race *maculosa* has been considered a synonym of *fulvigula* (Phillips, Monog. Anat., vol. 2, 1923, p. 61), although specimens in this Academy's collection before me show clearly that it is worthy of recognition. The validity of *tristis*, of the northeastern United States, also has been questioned (Short, Wilson Bull., vol. 55, no. 1, 1943, pp. 3-7), and *tristis* may become a synonym of *rubripes*: but surely the solution of the problem lies in the taking of breeding males in the United States.

---

[1] See also the Proceedings of this Academy, vol. 94, 1942, pp. 89-106.

The principal color difference separating *diazi* and *novimexicana* from the eastern black ducks is the presence of a conspicuous white wing-bar both in front of and behind the speculum, a character also found in the widespread *A. platyrhynchos.* Numerous individuals of *rubripes, fulvigula* and *maculosa* have the secondaries tipped with white, and an adult male *maculosa* (A.N.S.P. 84582), taken by Wharton Huber at Chenier Le Tigre, Louisiana, has, in addition, a narrow but well-developed white bar on the subterminal portion of the secondary wing-coverts, bordering the black tips, thus showing an approach to *diazi* and *novimexicana.*

It is of interest to note that both *rubripes* and *fulvigula* have been reported from Pleistocene deposits in Florida (cf. Wetmore, Smiths. Misc. Coll., vol. 85, no. 2, 1931, pp. 20, 21).

Columbigallina passerina volitans new subspecies

TYPE.—Ad. ♂, A.N.S.P. no. 149073, collected on Little Inagua, Bahama Islands, March 8, 1941, by George Vanderbilt.

Description.—Most nearly related to *C. p. bahamensis* (Maynard), from the more northern Bahama Islands, but upper parts decidedly paler. Resembles also *C. p. exigua* Riley, from Mona Island, but averages larger; adult male with under parts slightly duller and more grayish vinaceous; black squamations on fore neck and chest less prominent and more restricted; bill black with little or no red at base (in *exigua* the bill is bicolored, evident in most skins examined, the basal half being " vinaceous " in life). The adult female is virtually indistinguishable from the female *exigua,* but averages smaller and the bill is usually more extensively black.

Measurements of type.—Wing (maximum measurement) 79.2, tail (from base of middle rectrices) 47.5, bill (exposed culmen) 10.5, tarsus 16.25 mm.

Range.—Southern Bahama Islands, including Great and Little Inagua, the Caicos and Turk Islands.

Remarks.—Although all the differences separating *volitans* from *exigua* are average, they serve, collectively, to distinguish these two sub-species. I have, in fact, been able to pick out every adult male from Mona in the extensive series before me by means of the above characters. The average size difference can best be shown by wing measurements. The wings of 22 males from Mona measure (in millimeters) 74.5 to 80 (76.4), those of 14 females 73 to 79 (76). Wings of 14 males from Great and Little Inagua measure 77.5 to 84 (80), those of 9 females from Great Inagua 76-81 (78.3). Seven males from the Caicos Islands have wings of 77.25 to 81.5 (78.7).

A single male from Acklin Island (wing 80) and female from Mariguana (wing 83) are decidedly darker above than specimens from Great and Little Inagua and the Caicos Islands and had best be referred to *bahamensis.*

I am greatly obliged to Dr. John Zimmer of the American Museum of Natural History, Dr. Alexander Wetmore and Dr. Herbert Friedmann of the United States National Museum, and to Mr. Boardman Conover of the Chicago Natural History Museum, for permission to examine specimens in these institutions.

Dulus dominicus (Linnaeus)

A short time ago I examined the large series of the palm chat in the American Museum of Natural History, mainly collected by Rollo H. Beck in the Dominican Republic, and it appeared to me that the birds were darker and browner above than skins from the Republic of Haiti. Subsequently I examined ample series from both republics for comparison and must admit inability to divide the species into geographic races. There is great individual variation, both in color and size, throughout the range, with a slight tendency to darker back and heavier streaking on the under parts in birds of northeastern Hispaniola (Samaná Peninsula). I entirely agree with Wetmore and Swales that "there is evident tendency toward geographic distinction in color but—this is not expressed with sufficient definition to warrant the naming of local races on Hispaniola" (U. S. Nat. Mus., Bull. 155, 1931, p. 351). Furthermore, specimens from Gonâve Island ("*D. d. oviedo*" Wetmore) in fresh plumage can be matched perfectly both in color and size with mainland birds.

Wing measurements of specimens from the Dominican Republic range from 83.5-94 mm., from the mainland of the Republic of Haiti 82-91 mm., from Gonâve Island 87.5-93.5 mm. The specimen with the longest wing (A.M.N.H. no. 164502) was taken at Sánchez.

There is also considerable variation in bill length. The exposed culmen of mainland specimens measures 13.5-16 mm., of Gonâve Island individuals 14.5-16 mm. There is a slight tendency toward a shorter bill in birds from the southern peninsula of Haiti (Massif de la Hotte), which show a range in length of culmen from 13.5 to 15 mm. (10 specimens). The two mainland birds with the longest bills are a male from Hinche (U.S.N.M. no. 264799) and a female from Port-au-Prince (A.N.S.P. no. 82337), both of which have the exposed culmen 16 mm. in length. There are no differences in the sexes of this species so far as I can ascertain.

It will be noted that the palm chat is widespread in Hispaniola, occurring from sea level to near the summits of the highest mountains, but it is most numerous at low elevations. Beck has taken specimens on Loma Tina, the highest mountain of Hispaniola, and I have found it nesting on the La Selle ridge in Haiti.

The palm chat is a strong flier and it is surprising that it is unknown from the surrounding islands with the exception of La Gonâve, where it is rare and local. We find a nearly parallel case in the abundant Hispaniolan woodpecker *Centurus striatus,* which has never been recorded from any of the nearby islands.

Specimens examined in this study are from the following localities: Samaná Peninsula (25), "Santo Domingo" = Ciudad Trujillo (28), Moca (3), La Vega (5), Santiago de los Caballeros (1), La Canita (1), Caña Honda (1), Loma de Molote (2), Haina (1), Azua (1), Túbano (3), Loma Tina (3), San Juan (1), "Rivier Bar" = Rivière Barre (3), Moustique (1), Dondon (1), Fort Liberté (1), Terrier Rouge (1), L'Atelaye (1), Cerca la Source (2), Las Cahobas (2), Hinche (1), Fond Verettes (1), Port-au-Prince (4), "Le Coup" = Pétionville (1), Kenscoff (1), Furcy (2), L'Acul (1), Moline (2), Jérémie (6), Moron (1), Gonâve Island (7; 4 in worn plumage).

I wish to express my thanks to Acting Director Orr Goodson and Mr. Karl Schmidt of the Chicago Natural History Museum, Dr. Herbert Friedmann of the United States National Museum, and Dr. John Zimmer of the American Museum of Natural History, for the loan of material in their charge.

NOTULAE NATURAE

NUMBER 149 OF MARCH 14, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THREE NEW SPECIES OF THE RETICULOSA GROUP OF THE BLATTID GENUS CARIBLATTA (ORTHOPTERA, BLATTIDAE, PSEUDOMOPINAE)

BY JAMES A. G. REHN

Curator, Department of Insects, Academy of Natural Sciences of Philadelphia

The genus *Cariblatta* was erected by Hebard in 1916,[1] based upon *Blatta punctulata* Beauvois, a species originally described from Hispaniola. At the time of its proposal it included ten species or subspecies from the southeastern United States, the Bahamas, the Greater Antilles, certain of the Lesser Antilles, Panama and Trinidad. By 1927, when Rehn and Hebard published their comprehensive study of the Blattidae of the West Indies, the number of forms of *Cariblatta* then known [2] had risen to twenty-seven, of which six were known from Trinidad and Central and South America as far south as north-central Argentina, but the great majority (i.e. nineteen) were exclusively West Indian. Four additional species have been described since 1927, these all West Indian. To date, however, no member of the genus had been reported from Central America north of Panama.

In their 1927 study of the West Indian species of *Cariblatta* Rehn and Hebard tentatively recognized six species-groups in the genus, of which four had all of their components then known restricted to the West Indies, with the exception of one species shared with the southeastern United States. One of these groups was the Reticulosa Group, then including *reticulosa* (Walker) and *nebulicola* Rehn and Hebard. The latter was entirely Jamaican, and the former, described from Jamaica, was, on the basis of Hebard's earlier study, considered to occur in Puerto Rico as well. In 1932 I added to the Reticulosa Group the species *advena* from the southwestern peninsula of Hispaniola.[3]

---

[1] Trans. Amer. Entom. Soc., XLII, pp. 147-186, pls. XI-XIII, (1916).

[2] See Rehn and Hebard, Bull. Amer. Mus. Nat. Hist., LIV, pp. 12-47, (1927).

[3] Trans. Amer. Entom. Soc., LVIII, p. 125, pl. VIII, figs. 12-14, (1932). [♂; Fond des Negres, Massif de la Hotte, Haiti, Hispaniola.]

In 1930 while making Orthoptera field studies for the Academy in lowland rain forest in the coastal area of northern Honduras, I encountered a species of *Cariblatta,* chiefly in primeval and undisturbed conditions, which I at once recognized as a member of the Reticulosa Group. This species was taken on a number of occasions during a three weeks' stay in that area. Subsequently a single specimen of the same species and a series of a related species, another member of the Reticulosa Group, were found in the Philadelphia collections among material taken in British Honduras, a distance to the northwest of my Honduran locality. Recently I have been privileged to re-examine the Aibonito, Puerto Rico male reported in 1916 by Hebard as *reticulosa,* and I am now able to say that the Puerto Rican insect is specifically distinct from any of the other members of the group, and that the two Central American forms are similarly unrecognized species, these latter more intimately related to the known Jamaican members of the group than they are to the Hispaniolan *advena,* or the Puerto Rican *hebardi* here described.

The Reticulosa Group is made up of species of small to relatively large size (for a genus composed of species of distinctly below-the-average blattid in bulk), of slender build, with paired caudad-diverging dark bars on the pronotum, and a greater than usual reduction of the dark arabesque and lyrate lineations of the disk of the same. The chief features separating the species are to be found in the male genitalia and the major elements of the pronotal and facial patterns.

The occurrence of two members of this otherwise West Indian group of the genus—in fact the sole Central American members of the genus known from that region north of Panama—in lowland Honduras and British Honduras is definitely of zoogeographic interest. It is clear that these species are endemic and have not been introduced from West Indian lands; in my opinion their occurrence is in no way due to hurricane dispersal, and in at least one of the cases, where I collected all the available individuals but one, it was either in or near the margin of undisturbed primeval lowland tropical rain forest.

The probable role of a former land connection between Central America and the Jamaica-Hispaniola-Puerto Rico arc of the Greater Antilles, in accounting for the now known distribution of the members of the Reticulosa Group, cannot be lightly dismissed, as the same correlation is to be noted in regard to the Detersa Group of the genus *Neoblattella* to be discussed in another paper, in addition to the distributional evidence of a number of other species, species-groups or genera of blattids. Among the latter may be mentioned the various subspecies of *Ischnoptera rufa,* of the Rubiginosa Group of the same genus, of *Blaberus craniifer,* and of the genera *Nyctibora* and *Audreia* in the West Indies and Central America. All of these entities occur in both Central America and Jamaica, with the exception of *Blaberus craniifer,* which is found only in Cuba (and as an introduction from Cuba in southern Florida) in the Antillean section. In other families of the Orthoptera we find parallel cases which add definite evidence regarding the concrete character of this former Central American-Antillean connection, such as the presence of members of the Eumastacinae, including flightless forms, in Cuba and Hispaniola; of the tettigoniid genus *Stilpnochlora* in Cuba, Jamaica and southern Florida; the otherwise mainland mantid genus *Paramusonia* and *Phyllovates* in Cuba (in the former case) and Jamaica and Hispaniola (in the latter); the occurrence of *Paratettix frey-gessneri* in Mexico, Central America, Cuba and Jamaica, and of the otherwise mainland genus *Gryllita* in Cuba. In addition a number of other cases are known to me from material now in hand, but until critical study of all the forms involved can be completed I refrain from citing them. However, the amount of evidence along these lines known to me from purely Orthopteran sources is far greater than the existing literature attests, and involves entities of major rank which are as yet unreported from the Antilles.

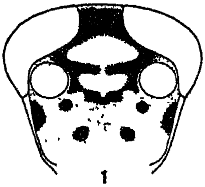
Cariblatta hylaea[4] new species Figs. 1-6.

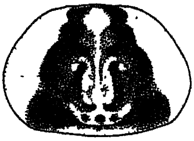
Closely related to *C. nebulicola* Rehn and Hebard, from the Blue Mountains of Jamaica,[5] which approaches *hylaea* in size more nearly than any other member of the Reticulosa Group except *C. icarus,* here described. However, *C. hylaea* is appreciably larger than *C. nebulicola,* has the marginal field of the tegmina somewhat broader, the paired dark bars on the pronotum averaging broader and denser, and the subgenital plate of the male as a whole is more produced and moderately asymmetrical, with definite post-like style-bearing processes, the dextral one appreciably more prominent than the sinistral, intervening portion of the distal margin much narrower produced and strongly rounded linguiform, quite different from that found in *nebulicola.* The styles of the male subgenital plate in *hylaea* are more conspicuous than in *nebulicola,* and their distal extremities instead of having a dense mat of spines are supplied with a transversely-disposed linear series of imbricate spines of much greater individual length than those of *nebulicola.*

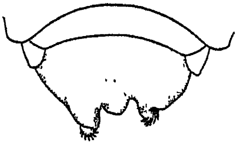
---

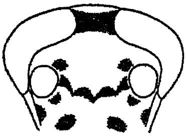
[4] From *'Υλαῖα*, belonging to the forest, in allusion to the habitat of the species.

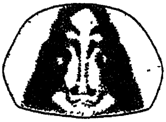
[5] Bull. Amer. Mus. Nat. Hist., LIV, pp. 14, 19, pl. 1, fig. 1. [♂ (*type*), ♀ ; Morces Gap, Blue Mountains, Jamaica, elevation 4980 feet.]

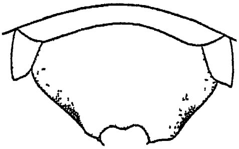

1

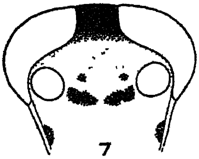

2

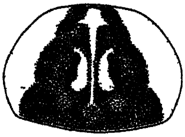

3

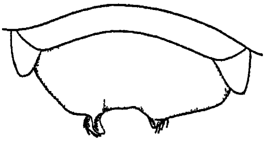

4

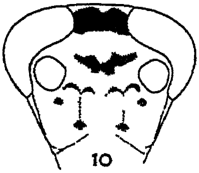

5

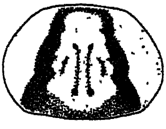

9

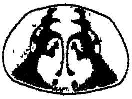

7


6


12


10


8


11

Cariblatta hylaea new species. Lancetilla, Honduras. Male (*type*). Fig. 1.—Face pattern (greatly enlarged). Fig. 2.—Pronotal pattern (X 6). Fig. 3.—Ventral aspect of subgenital plate (greatly enlarged). Male (*paratype*). Fig. 4.—Face pattern (greatly enlarged). Male (*paratype*). Fig. 5.—Pronotal pattern (X 6). Male (*paratype*). Fig. 6.—Pronotal pattern (X 6).

Cariblatta icarus new species. Rio Grande, British Honduras. Male (*type*). Fig. 7.—Face pattern (greatly enlarged). Fig. 8.—Pronotal pattern (X 6). Fig. 9.—Ventral aspect of subgenital plate (greatly enlarged).

Cariblatta hebardi new species. Aibonito, Puerto Rico. Male (*type*). Fig. 10.—Face pattern (greatly enlarged). Fig. 11.—Pronotal pattern (X 6). Fig. 12.—Ventral aspect of subgenital plate (greatly enlarged).

Type.—♂; Lancetilla, near Tela, Atlantico, Honduras. August 30, 1930. (Honduras Expedition; J. A. G. Rehn, in rain forest.) [Academy of Natural Sciences of Philadelphia, Type no. 5697.]

Size relatively large (for the genus), somewhat surpassing *C. nebulicola* and definitely greater than that of *reticulosa* or *advena*; general form essentially as in *nebulicola.*

Head in outline broad reversed pyriform, the greatest width across eyes but faintly less than head depth; interocular space at vertex equal to two-thirds that between antennal scrobes (as 8 to 13). Palpi of the slender type usual in the genus, distal article equal to four-fifths the length of the penultimate one, the latter slenderly infundibuliform; antepenultimate article subequal in length to penultimate.

Pronotum in form as in related species, greatest length contained nearly one and one-half times in greatest pronotal breadth.

Tegmina in form and general proportions and venation as in related species, in length surpassing apex of abdomen by slightly more than the pronotal length; marginal field slightly broader proportionately than in *C. nebulicola*; costal veins as a whole slightly more longitudinal in trend than in *nebulicola.*

Supra-anal plate transverse, its distal margin subtrigonally but broadly arcuate, with a very shallow median emargination, the whole plate but very faintly subtectate in transverse section. Cerci fusiform, not quite three times as long as the subgenital plate, distinctly deplanate dorsad, the outline of the individual articles giving the whole cercus a moniliform appearance. Subgenital plate moderately transverse, distinctly but not pronouncedly asymmetrical, and with paired, quite stout, styligerous processes, of which the dextral is the larger and more produced, the latter as seen from the ventral surface broadly rounded at its distal extremity with the superincumbent style placed chiefly on the dorsal surface, the sinistral process more blunt trigonal in general outline as seen from the venter, and with the distal portion of its margin slightly concave, in ventral aspect exposing a greater proportion of its style; both styles with their dorsal border arcuate and armed with a linear series of imbricate, somewhat arcuate spines pointing inward; interstylar portion of distal margin of subgenital plate no broader than either of the styligerous processes, quite strongly arcuate produced distad, the margin slightly asymmetrical, ventral surface of lobe not deplanate, appreciably reversed tectate in transverse section.

General limb structure as usual in genus; cephalic femora with ventro-cephalic margin having the pair of large distal spines appreciably unequal in length, the more distal about one and one-third times the length of the other, proximal group of large spines on same margin three to four in number (see section on morphological variation for discussion of this character), their definition from the more uniform, shorter and more distal series of spines, which numbers nine to eleven, not sharply indicated, the spine length transitionally graded; ventro-caudal margin of cephalic femora armed with four well-spaced large spines, one of which is apical. Caudal limbs with tarsi equal to but slightly more than two-thirds of tibial length, caudal metatarsus equal to three-fifths of total tarsal length. Other limb features as typical of *Cariblatta.*

Allotype.— ♀; same data as type except date is August 2, 1930. [Academy of Natural Sciences of Philadelphia.]

Compared with the above description of the male the female shows the following noteworthy features.

Size and general form as in male.

Head across eyes faintly narrower proportionately than in male, this breadth to head depth being as 36 to 43; interocular space at vertex equal to approximately three-fourths that between antennal scrobes (as 11 to 15).

Supra-anal plate essentially as in the same sex of *C. nebulicola,* median emargination of margin pronounced, quite broadly V-emarginate.[6] Subgenital plate of the scoop-shaped type characteristic of this sex of *Cariblatta,* its medio-distal section moderately produced and rounded.

Cephalic femora with ventro-cephalic margin having five large spines in the proximal group (an individual and unusual condition, regarding which see discussion under morphological variation).

Coloration.—The general color pattern of *hylaea* is essentially as in *C. reticulosa* (Walker) and *nebulicola* Rehn and Hebard, which have already been fully discussed at length by Hebard[7] or Rehn and Hebard.[8] The following discussion of color features is accordingly restricted to those showing discordance from the same of the already fully characterized relatives, or a noteworthy range of individual variation.

Facial dark pattern varying in intensity with degree of emphasis of general dark pattern, ranging from a complex saturated pattern in intensively colored individuals even more pronounced than that figured by Hebard for *reticulosa,*[9] in that the upper concave transverse bar is complete and unbroken mesad, while the second concave bar is always divided mesad into two elements, and the ventral groups of maculae are usually isolated from one another and rarely connected laterad, while lateral juxtascrobal dark subvertical bars may connect, or nearly connect, the lateral extremities of the two transverse bars referred to here as "concave"; to an opposite (recessive) extreme with the weaker elements of the intensive extreme of face pattern obsolete to subobsolete, and the more persistent dark areas broken up into maculae which indicate the position of these bars in the richly pigmented intensive extreme.

Pronotum with the tonal depth of its dark bars and of the more fluctuating arabesque pattern of the enclosed disk usually, but by no means invariably, equal to that of the facial pattern. The completeness and complexity of the median discal arabesque pattern also varies individually to a considerable degree, as in the other species of the group, the central lyrate elements in strongly patterned individuals are connected with the broad lateral bars or scroll-like arms of the same (see fig. 6); in weaker emphasis the same elements are distinct but not connected laterad, and in the most recessive type of pattern the central lyration is obsolete or represented only by dots. The broad lateral dark pronotal bars are definitely diverging caudad, as in all the other forms of the group, but in *hylaea* they are always relatively broader and increasing in breadth caudad; in intensively colored individuals the breadth of the bars is quite marked. Whether the bars are or are not connected at the cephalic and caudal margins of the pronotum is apparently in response to the general pattern depth. The external margins of the broad pronotal bars are definitely undulate. The dark humeral bar on the tegmina also varies in its extent distad and in general depth with the pattern tone, in the intensive extreme being traceable to nearly the tegminal apex, while in the most recessive representation the bar can hardly be seen distad of the middle of the tegmen. In certain individuals the anal sulcus is pencilled with the dark tone, very finely or more broadly, but this condition is not invariably associated with the more intensive general pattern, as some relatively pale specimens show this as definitely as others of generally pronounced dark coloration, while some of the latter show no suffusion of the sulcus.

---

[6] See discussion under morphological variation.

[7] In re *reticulosa;* Trans. Amer. Entom. Soc., XLII, p. 158, (1916).

[8] In re both species; Bull. Amer. Mus. Nat. Hist., LIV, pp. 19, 20, (1927).

[9] Trans. Amer. Entom. Soc., XLII, pl. XII, fig. 1, (1916).

The distal extremities of the tibiae and of most of the tarsal articles, most of the surface immediately about the tibial spine insertions, and a medio-longitudinal ventral dark bar on the abdomen are definitely infuscate in all, the degree varying with the whole pattern, while dark linings of the femoral carinae and margins are indicated to varying degrees as in related species.

The pale base color is light ochraceous-buff, while the dark pattern ranges from cinnamon-brown to prout's brown.

The immature condition has the usual multipunctate color pattern of these stages, as seen in other species of the genus, with the dark arabesque pattern of all the nota strongly pronounced and complex. The facial pattern is as in the adults, fully developed and strongly marked.

Measurements (in millimeters)

Lancetilla, Honduras	Length of body	Length of pronotum	Greatest breadth of pronotum	Length of tegmen	Greatest breadth (mesad) of tegmen
♂, *type*	11.5	2.6	3.7	11	3.2
♂, *paratype*	9.7	2.2	3.4	10.7	2.9
♀, *paratype*	12.2	2.6	4	12.2	3.4
♀, *allotype*	11	2.7	3.9	11.9	3.2
♀, *paratype*	10.5	2.4	3.6	9.7	3

These measurements show that both sexes exhibit a considerable degree of individual size variation in a series taken at the same locality and in a definitely restricted area.

Morphological variation.—The number of proximal large spines on the ventro-cephalic margin of the cephalic femora varies from two to five, with three the more usual number and two and five occurring only rarely, the latter, except for a single case (allotype), on but one limb with four on the pairing margin. As usual in the *Neoblattella* complex there is occasional uncertainty as to where the dividing line should be drawn between the larger proximal group and the more distal series of smaller spines, on account of one spine being shorter than those of one classification and longer than those of the other. Closer approximation, as usual, has been the deciding factor in making the count given above. In all specimens of *hylaea* seen the large distal group of spines on the same margin numbers but two.

The subgenital plate of the male shows some slight plasticity in its form in the considerable series of the species before me. However, this variation is never sufficiently modifying to mask the essential specific characteristics of this plate. The post on the dextral side may be somewhat shorter than as figured in the type, but it is always at least slightly more prominent than that on the sinistral side, and generally much more so. The median linguiform lobe of the distal margin varies in its exact outline from full and rounded through low and broadly rounded to subtrigonal, but always is less produced than the lateral posts, while in a single male the immediate apex of the lobe is subtruncate. The degree to which the male subgenital plate has been subjected to pressure, and thus flattened, causes a change in the exact shape of the lateral margins of the plate as seen from the venter, the actual margin on the dextral side, for instance, being low sigmoid in outline, but the border of the base of the dextral post is nearly straight oblique in ventral aspect, and if the actual margin has been pushed over the post base thickening, the true margin is not evident in that view.

The female supra-anal plate is usually as described for the allotype, i.e. trigonally notched mesad, but rarely this area is more rounded emarginate.[10]

Distribution.—As far as at present known *C. hylaea* occurs only on the lower coastal slopes of the Sierra Pija and the floor of its small intrusive valleys in the Tela region of the north coast of Honduras, and in a section of the low country of British Honduras (Rio Grande). Doubtless it will be found more broadly distributed in both sections, but it is not represented in extensive collections made in the Motagua Valley of lowland eastern Guatemala, or in those from a number of areas in the Atlantic lowlands of both Costa Rica and Panama. The Sierra Pija in Honduras and the Coxcomb Mountains in British Honduras are regarded by some geologists and zoogeographers as relicts of a former land connection with Jamaica.

---

[10] One female paratype bears an oötheca, which is carried with the suture dorsad.

Bionomics.—At Lancetilla, a few miles inland from Tela, Honduras, *hylaea* was found at the foot and over the lower slopes of the first ridges or spurs of the Sierra Pija. It was encountered at elevations ranging from approximately 75 feet above sea-level on the floor of the largely cleared Lancetilla Valley, to as high as 800 feet, the latter being as high as collecting was carried on over forest trails. At the foot of the hills largely abandoned banana patches, interspersed with scattered trees of the original forest, were being strangled by second growth, often platanillo (*Heliconia*) with some guarumo (*Cecropia*). The hill slopes at the head of the little valley, however, were covered with undisturbed primeval lowland forest, with ceibas, figs, corozo palms (*Attalea gomphococca*) and many other types—the usual varied array which makes up the Central American rain forest.[11] Work here was largely done along the narrow and steep forest trails. In the tangled and choked banana patches *hylaea* was shaken from hanging dead banana and guarumo leaves, while in the undisturbed forest on the slopes it was swept from undergrowth foliage, of both low ground cover and higher stands, taken from hanging dead leaves and sifted from dead leaves on the ground. Every indication pointed to its occurrence in banana leaves as intrusive from the forest, where it was present in a greater variety of environments.

Immature individuals were taken on August 24, 26 and 28, and adults secured on various dates between August 28 and September 9, 1930. The single British Honduras specimen was taken in February, 1932.

Paratypes.—I am regarding as paratypes all adult material seen, other than the type and allotype, i.e. twenty-five males and thirteen females from the type locality, and one male from Rio Grande, British Honduras.

Specimens examined: 44; 27 ♂, 14 ♀, 2 immat. ♂, 1 immat. ♀.

HONDURAS: Lancetilla, near Tela, Atlantico, 75-800 feet elevation; VIII, 24-IX, 9, 1930; (Honduras Expedition; J. A. G. Rehn); 26 ♂, 14 ♀, (*type, allotype* and *paratypes*), 2 immat. ♂, 1 immat. ♀; [A.N.S.P.].

---

[11] A brief description of this forest will be found in the author's semi-popular account of field work done in Honduras in 1930, in the June, 1932, issue of the Bulletin of the Pan American Union (specifically pages 399 to 400).

British Honduras: Rio Grande; II, 1932; (J. J. White); 1 ♂ (*paratype*); [Hebard Cln.].

Cariblatta icarus[12] new species Figs. 7-9.

This species is one of the larger members of the group, being of nearly the same bulk as *C. nebulicola* R. and H. or *C. hylaea* new species, and definitely larger than *C. reticulosa* (Walker), *advena* Rehn or *hebardi* new species. In pronotal pattern it more nearly resembles *C. nebulicola,* of the Blue Mountains of Jamaica, while the face pattern is much weaker and simpler than in that species, more nearly approaching the very simple one of the Hispaniolan *C. advena* Rehn.[13] The subgenital plate of the male in its structure is much nearer that found in *advena*[14] than that of any other of the group, but is quite distinctive in having the paired nodes or posts of the margin moderately separated, with a low but well rounded " lip " between, the posts short and subtruncate to subacute in distal outline, their superincumbent styles dorsal in position, and these bearing dorsad a linear, subimbricate series of curved spines somewhat as in *C. hylaea.* The same group of curved and subimbricate spines in *advena* is not arranged in a single linear series, but instead grouped in a cluster. The supra-anal plate in the male of *icarus* is in general similar to, but more shallowly emarginate meso-distad than in *advena.*

Type.—♂; Rio Grande,[15] British Honduras. February, 1932. (J. J. White.) [Hebard Collection, Type no. 1364.]

Size averaging slightly smaller than in *C. hylaea,* but within the individual size range found in our series of that species, subequal to that of *C. nebulicola*; form in general as in *hylaea.*

Head of reversed pyriform outline, with the greatest breadth across the eyes subequal to the greatest depth of the head; interocular space at vertex equal to approximately two-thirds the space between the antennal scrobes (as 9 to 14). Palpi as in *hylaea.*

Pronotum in shape as in *hylaea,* with greatest length contained one and one-half times in greatest breadth.

Tegmina as in *C. hylaea* but marginal field somewhat narrower, more nearly approaching the relative width of that area in *C. nebulicola*; costal veins with their trend as longitudinal as in *hylaea.*

---

[12] From *Icarus,* son of Daedalus.

[13] See Trans. Amer. Entom. Soc., LVIII, pl. VIII, fig. 13, (1932).

[14] See Trans. Amer. Entom. Soc., LVIII, pl. VIII, fig. 14, (1932).

[15] Rio Grande is the name of a small river with its mouth about three miles north of Punta Gorda. No town of this name is indicated on any available map of the area.

Supra-anal plate essentially as in *hylaea,* median emargination of the distal margin very shallow and not at all well indicated. Cerci as in *C. hylaea,* equally moniliform. Subgenital plate moderately transverse, less definitely asymmetrical than in *hylaea,* with the two short styligerous processes or posts less dissimilar in outline and more equal in production, which collectively is less than in *hylaea,* while the ventral surface is more deplanate and the sculpture less modified by the contour of the processes, general form of plate as seen from venter, with lateral margins obliquely converging to the disto-lateral angles of the processes, each of which latter is definitely broader than long and variably oblique subtruncate distad, with the disto-mesal angle rectangulate to subacute,[16] and much more pronounced than the disto-external angle; distal margin of plate between lateral posts definitely biconcave, the median lappet very low and broadly arcuate, much less produced proportionately than in *hylaea;* styles dorsal in position on the styligerous processes, little, if at all, evident in direct ventral aspect, smaller than in *hylaea,* with a similar single dorsal linearly-arranged crest of imbricate curved spines, but these are smaller, definitely less conspicuous, and on each style composed of fewer spines (i.e. three to five).

Limbs appreciably more elongate and attenuate than in *hylaea,* this being particularly evident in the cephalic femora and tibiae. Cephalic femora with proximal group of larger spines on the ventro-cephalic margin numbering four,[17] grading in length into the more distal shorter series as in *hylaea,* apical pair on same margin as unequal in length as in *hylaea*; ventro-caudal margin of cephalic femora with four well-spaced spines (including apical one in count). Caudal limbs with tarsi lacking in both males seen. Tarsal claws and arolia as typical of *Cariblatta.*

Allotype.— ♀ ; same data as type but date is November, 1931. [Hebard Collection.]

Compared with the above description of the male (type) the female shows the following noteworthy features:

Size in general similar, general form somewhat stouter than in male, tegmina proportionately shorter and less elongate.

Head in general shape as in male but somewhat narrower proportionately, breadth across eyes being one-sixth less than depth of head (as 36 to 41); interocular space at vertex equal to six-sevenths that between antennal scrobes (as 12 to 14).

Tegmina very slightly shorter proportionately than in the male sex, distal half of whole tegmen somewhat more tapering, with distal extremity narrower, both margins there more oblique and less arcuate convergent to the more narrowly rounded apex.

---

[16] This varies somewhat in the two male individuals of the species which are before me, and the same is true of the exact degree of obliquity of the distal margin of the processes.

[17] In the series of the species this number ranges from three to five, four or five being the more usual number present. Those individuals with both cephalic limbs yet attached (four out of seven) show no variation in number of these spines on the two femora.

Supra-anal plate of the general type found in the other members of the species group, its median emargination definitely and rather broadly U-shaped, surface contour of plate more roundly elevated disto-mesad as seen in caudal aspect. Subgenital plate slightly broader and less produced caudo-mesad than in *C. hylaea,* the distal margin there more broadly rounded.

Caudal tarsi equal to three-fourths the length of the caudal tibiae, the proximal article (metatarsus) equal to four-ninths of the entire caudal tarsal length.

Coloration.—General dark pattern essentially as in *C. nebulicola*, particularly in individuals of the latter with the dark pronotal bars narrower, while the dark humeral stripe on the tegmina is less extensive and weaker than in any of the previously described species of the group or in *C. hylaea,* in all the specimens seen being merely a narrow clouding not reaching distad of the broadest section of the anal field, which it borders. The pale base color is ochraceous-buff, being merely a tinting of the lateral hyaline portions of the pronotum and of the tegmina, dark markings prout's brown to mummy brown. Facial dark pattern greatly reduced (see fig. 7), occasionally almost obsolete, upper elements of the pattern usually absent, median one most persistent, in no case are any complete transverse bars, but always composed of dots and (or) dashes. Pronotum with the paired dark bars narrower than in the other species of the group, but with their outlines sharper and more linearly definite, in this respect suggesting *C. advena,* of Hispaniola; discal lyrate or arabesque pattern very meager, sometimes little more than a pair of broadly spaced dots cephalad and a more closely placed pair caudad, in others (as in type) the latter pair are the caudal points of a pair of inbowed closely-placed longitudinal lineations, while the former form the centers of more lateral and shorter, paired obtuse-angulate lines. The limb coloration and that of the ventral surface are as in *C. hylaea,* except that the tibial and tarsal extremities are not as distinctly darkened.

Morphological variation.—The sole noteworthy variation of this type seen is in the number of proximal spines on the ventro-cephalic margin of the cephalic femora. These range from as few as three to as many as five, with four present on the majority of the femora. No difference is seen in the number present on the two limbs in those specimens which have both preserved.

Distribution.—Known only from three localities in British Honduras.

Paratypes.—In addition to the type and allotype I have before me one male and four females, all of which I consider paratypes. These are from the type locality (2 ♀), Punta Gorda (1 ♂, 1 ♀), and Columbia (1 ♀), British Honduras, all taken by J. J. White, and in the Hebard Collection and that of the Academy of Natural Sciences of Philadelphia.

Measurements (in millimeters)

	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Greatest breadth (mesad) of tegmen
♂, Rio Grande, British Honduras, *type*....	10.4	2.2	3.2	12.2	3.2
♂, Punta Gorda, British Honduras, *paratype*	10.9	2.4	3.2	11	3
♀, Rio Grande, British Honduras, *allotype*	10.7	2.4	3.5	11.4	3
♀, Rio Grande, British Honduras, *paratype* ...	10.4	2.4	3.5	12	3.2
♀, Punta Gorda, British Honduras, *paratype* ...	11.7	2.5	3.5	11.4	3.2
♀, Columbia, British Honduras, *paratype* ..	9.9[18]	2 4	3.5	11.5	3

Specimens examined: 7; 2 ♂, 5 ♀.

BRITISH HONDURAS: Rio Grande; II, 1932, XI, 1931; (J. J. White); 1 ♂, 3 ♀ (*type, allotype* and *paratypes*); [Hebard Cln. and A.N.S.P.]. Punta Gorda; III, 1931; (J. J. White); 1 ♂, 1 ♀ (*paratypes*); [Hebard Cln. and A.N.S.P.]. Columbia;[19] IV, 1932; (J. J. White); 1 ♀ (*paratype*); [Hebard Cln.].

Cariblatta hebardi[20] new species Figs. 10-12.

1916. *Cariblatta reticulosa* Hebard, Trans. Amer. Entom. Soc., XLII, p. 157. (In part not of Walker.) [♂; Aibonito, Puerto Rico only.]

While this species bears a general resemblance to the Jamaican *C. reticulosa* (Walker), it is definitely larger and more nearly related to *C. nebulicola* Rehn and Hebard, also of Jamaica, *advena* Rehn of Hispaniola, and *hylaea* Rehn, of Honduras and British Honduras. From *nebulicola* the present species is seen to differ chiefly in being somewhat smaller, with its pronotum more nearly ovate-elliptical in outline, and its facial pattern much less developed, while the tegminal pattern has the humeral dark stripe continued distad over the greater portion of the tegmen, while the subgenital plate of the male is non-produced meso-caudad with the styles subequal in development, as contrasted with *nebulicola* in which the plate has a definite median production and the styles are unequal in development. From *advena* the following major features will readily distinguish *hebardi*: appreciably larger size, proportionately broader interspace between eyes, the more usual group type of dark pattern on the pronotum, when compared with the distinctively bilineate one of *advena,* the presence of a median dark lyrate pattern on the pronotal disk, which is entirely absent in *advena,* in the anal sulcus costad of the humeral stripe being pencilled appreciably with dark, instead of unmarked as in *advena,* and in less deeply emarginate medio-distal portion of the male subgenital plate. Comparison with *C. hylaea,* described on a preceding page, shows that *hebardi* can readily be distinguished by its somewhat smaller size, much less complex dark face pattern, and markedly different construction of the male subgenital plate, which does not have the styles placed upon asymmetrically-developed protuberances, nor the interstylar portion of the distal margin produced in an arcuately labiate lappet, as in *hylaea.*

---

[18] Abdomen somewhat contracted.

[19] Apparently this is the locality which appears on the relevant sheet of the map of Hispanic America as "San Pedro Colombia," situated on the upper course of the Rio Grande at 88° 57′ W., 16° 17′ N., elevation 39 meters.

[20] In honor of my long-time friend and colleague, Mr. Morgan Hebard, who described the genus *Cariblatta*, and who first recorded the specimen on which this species is based.

Type.—♂; One mile north of Aibonito, District of Guayama, Puerto Rico. July 17, 1914. (H. G. Barber; beating.) [American Museum of Natural History.]

Size medium (larger than in *reticulosa* or *advena,* smaller than in *nebulicola* or *hylaea*); general form as in other members of the Reticulosa Group.

Head in outline broad reversed pyriform, greatest breadth across eyes subequal to head depth; interocular space at vertex equal to three-fourths that between antennal scrobes (as 8.5 to 11.5). Palpi essentially as described for *C. hylaea.* Antennae damaged in unique type.

Pronotum in proportions and outline as in *hylaea,* but cephalic section of margin very slightly more arcuate, greatest length contained one and one-half times in greatest pronotal breadth.

Tegmina of the character usual in the group but faintly narrower and more lanceolate than in *C. hylaea,* the greatest breadth contained three and nine-tenth times in the greatest length, as against approximately three and one-half times in *hylaea,* surpassing apex of abdomen by more than one and one-half times the pronotal length; marginal field definitely narrower than in *hylaea,* essentially equal in breadth to that of *nebulicola.*

Supra-anal plate relatively short and as a whole transverse low trigonal in outline, distal extremity with a decided but narrow V-emargination, dorsum of plate weakly keeled medio-longitudinally but as a whole quite deplanate and hence not at all tectate. Cerci incomplete in type, but proximal portions remaining are as in *C. nebulicola.* Subgenital plate strongly transverse, relatively flattened, distal margin but moderately asymmetrical, areas of stylar insertions not at all produced or pedunculate, median section of distal margin between styles subarcuately concave, slightly asymmetrical; both styles quite short, stout, incurved, internal face of the right one with its surface definitely concave excavate, dorsal surface of both styles with a series of imbricate curved spines, these directed mesad and as seen from ventral surface forming an arcuate adpressed crest on each style.

General limb structure as usual in the genus; cephalic femora with ventro-cephalic margin having the distal pair of spines appreciably unequal in length, the more distal about one and one-third times the length of the other, proximal group of large spines on the same margin with five clearly marked, the passage in spine length thence being gradual, so that the exact number considered to belong to the proximal group of large spines is a matter of personal equation, the combined total of this marginal series, regardless of length, being twelve;[21] ventro-caudal margin of cephalic femora armed with four well-spaced large spines, one of which is apical. Caudal tarsi missing from type.

Coloration.—Pale base color light ochraceous-buff, dark pattern prout's brown on pronotum and face, and cinnamon brown on the tegmina, ventral surface of the abdomen and bordering or ticking of the femora and tibiae; eyes clove brown. Face with dark pattern ventrad of usual broad transverse interocular bar consisting of a transverse, almost brace-shaped bar dorsad, this deepest mesad and with its blunt angle ventrad; below this are two laterally placed pairs of obliquely-disposed circular dots and finally a single pair of more closely-placed larger dots. Pronotal pattern with the paired dark bars moderately diverging caudad, these also broadening caudad and with their outline symmetrical but irregularly scalloped and eroded, the pale median disk of the pronotum with a definite but relatively simple lyrate dark pattern (see fig. 11). Tegmina with the dark pencilling continued from the bases of the tegmina to near the tegminal apices as a definite clouding, briefly interrupted at about the proximal fourth of the tegminal length; in addition the anal sulcus is finely dark pencilled for almost its entire length. Distal extremities of the tibiae but weakly darkened, pencilling about insertion of tibial spines well marked; ventral margins of median femora weakly, and of caudal tibiae distinctly, clouded with cinnamon brown; ventral surface of abdomen lineately clouded mediolongitudinally and more brokenly so along the spiracular lines laterad with cinnamon-brown.

Length of body, 8.4 mm.; length of pronotum, 1.9; greatest breadth of pronotum, 2.7; length of tegmen, 9.9; greatest breadth (mesad) of tegmen, 2.6.

I have seen only the unique type of this species, which is probably restricted to Puerto Rico.

---

[21] But one cephalic tibia is present, hence the figures here given are those found on a single limb.

NOTULAE NATURAE

NUMBER 150 OF MARCH 28, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW GENUS AND SPECIES OF PHANEROPTERINAE FROM EASTERN PERU (ORTHOPTERA; TETTIGONIIDAE)

BY JAMES A. G. REHN

Curator of Insects, The Academy of Natural Sciences of Philadelphia

The following very striking new genus has been carried in manuscript for a number of years, in the hope that additional material, with less altered coloration, would become available. This condition not having been realized, it seems desirable to make known this interesting member of the highly varied orthopterous fauna of eastern Peru. From the elevation given, this genus is presumably one of the Subtropical Life Zone.

PARANGARA[1] new genus

Related to *Angara* Brunner,[2] from southeastern Brazil, which it resembles greatly in general appearance, but differs in the narrower reflexed instead of deflexed, and dorsally sulcate, instead of non-sulcate, fastigium, in the caudal margin of the lateral lobes of the pronotum being broadly arcuate instead of straight oblique, in the caudal margin of the abdominal tergites bearing a longitudinally-disposed paired series of raised mucronate points in both sexes, plus a definite meso-dorsal caudad-directed production of the caudal margin of each tergite, all of which are not present in *Angara*, and in the ventral margins of the caudal femora being undulato-serrulate, instead of " inermia " as in the previously described genus.

Generic features.—Brachypterous in both sexes. Form subarachnoid. Head short, outline of genae, as seen in cephalic aspect, straight and subparallel, occiput roundly inflated; fastigium small, short, narrow, transversely concave depressed proximad, bluntly rounded cephalad as seen from dorsum, definitely recurved dorsad at extremity, briefly but distinctly sulcate medio-longitudinally dorsad. Antennae nodosely moniliform, two proximal articles much heavier than the succeeding ones, which latter are each slightly heavier distad than proximad, the resultant subnodose section to a greater or lesser degree with a coronal group of bristle-like hairs, proximal article over twice as long as second one. Eyes definitely exserted, globose.

---

[1] I. e. par, *like*, and *Angara*.

[2] Verh. Zool.-bot. Gesell Wien, XLI, pp. 4, 37, (1891). Genotype.—*A. albo-fasciata* Brunner (p. 38, pl. 1, fig. 1; ♂), from Theresopolis, Brazil.

Pronotum strongly sellate, cephalic and caudal margins of dorsum recurved dorsad as seen in profile, cephalic margin straight transverse and caudal strongly concave as seen from dorsum, transverse impressions not continued across disk; lateral lobes longitudinal, shallow, margins rectangulate ventro-cephalad, broadly arcuate caudad.

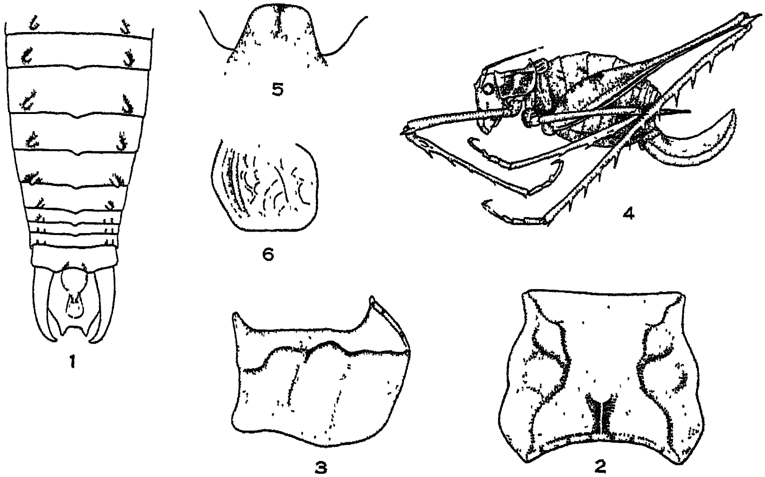
Tegmina in both sexes projecting caudad of the pronotum a distance less than the length of the latter, subquadrate (♂) or transverse rectangulate (♀) in outline as seen from the dorsum, composed chiefly of the stridulating field in the male, and a virtually analogous development of the same area in the female. Wings not evident.

Abdomen with the caudal margin of most of the tergites bearing a pair of dorso-laterally placed raised short ridges or folds, each disposed obliquely caudo-laterad, and ending in a blunt node, the fold reaching but a short distance proximad on each tergite, and the whole series becoming obsolete on the more distal tergites, but found equally marked in emphasis in the two sexes; distal margin of all tergites, except several of the more distal ones, in both sexes with a median broadly obtuse-angulate lobation, this also appreciably thickened and elevated on most of the more proximal tergites: male with ultimate tergite (i. e. preceding the supra-anal plate) transverse, its margin broadly arcuate-emarginate mesad; male supra-anal plate lanceolate; male cerci tapering, straight styliform with distal extremity sharply hooked; male subgenital plate relatively short, basin-shaped, narrowing distad, distal margin concave between short, nodose styliform processes of the plate; female supra-anal plate trigonal; female cerci tapering; ovipositor arcuate in profile, broad and subequal in depth, margins serrulate in distal half, apex acute; female subgenital plate trigonal, entire.

Prosternum transverse, unarmed, mesosternum and metasternum shallow, broad, strongly transverse, caudal margin definitely transverse truncate.

Limbs elongate, moderately slender, subarachnoid; cephalic coxae unarmed; cephalic femora over twice as long as the pronotal dorsum, unarmed except for the spinose genicular lobes and a single minute spinule at the ventral base of each of these lobes; cephalic tibiae with both faces of the tympanum apert, dorsal margins well spined with sublamellate spines, ventral margins more sparsely so with normal spines; median femora longer than cephalic, similar in type; median tibiae armed much as the cephalic tibiae; caudal femora in length surpassing that of the body, quite slender distad, definitely inflated proximad, genicular lobes and accessory spinules as in cephalic femora, the lobes moderately diverging as viewed from dorsum, both ventral marginal carinae of caudal femora appreciably crenulato-undulate; caudal tibiae surpassing the caudal femora in length by a distance greater than the combined length of the head and pronotum, dorsal margins strongly armed with sublamellate spines, set on the tibiae at definitely diverging angles, ventral margins with smaller, less conspicuous, more normal and less numerous spines; caudal tarsi incomplete.

Genotype.—*P. campa* new species.



Parangara campa new genus and species. Piches and Perené Valleys, Peru. Male (*type*). Fig. 1.—Dorsal outline of abdomen (× 5). Fig. 2.—Dorsal view of pronotum (much enlarged). Fig. 3.—Lateral view of pronotum (much enlarged). Female (*allotype*). Fig. 4.—Lateral view (× 2). Fig. 5.—Dorsal view of fastigium (greatly enlarged). Fig. 6.—Left tegmen as seen from above (much enlarged).

Parangara campa[3] new species

Type.—♂; Piches and Perené Valleys, 2000-3000 meters, Junin Province, Peru. [United States National Museum.]

Size medium (body, 11.4 mm.).

Head as seen from dorsum with greatest breadth across eyes slightly more than twice median length of head, the width across eyes equal to four-fifths the total depth of head as seen in cephalic aspect, breadth across genae equal to two-thirds of head depth; fastigium of vertex, while quite short, is definitely rostrate, as seen from dorsum subtrigonal in outline, not projecting cephalad of internal lamellate antennal scrobal margins; palpi with ultimate article over one and one-half times as long as antepenultimate one (as 26 to 16), penultimate article slightly shorter than antepenultimate (as 14 to 16). Antennae incomplete in type, but remaining portions as described under genus, proximal article with dorso-distal margin subangulate produced, second article subglobose, both proximal and second article with a number of bristle-like hairs.

---

[3] From the aboriginal Campas people of the Perené Valley.

Pronotum as seen in profile with the median two-thirds of dorsal outline subdeplanate, thence sharply ascending both cephalad and caudad, the flaring character of the cephalic margin also evident on the lateral faces, which is not the case with the caudal margin; as seen from dorsum the greatest breadth of the pronotum (i. e. across and including the lateral lobes) is one and one-half times as great as the medio-dorsal length, the latter subequal to the greatest breadth of the discal sections of the pronotum, which will be found in the cephalic and caudal portions of the disk, and while the lateral borders of the pronotal disk are hardly indicated structurally they are evident from colorational features, and while the least breadth of the disk mesad is hardly more than half that cephalad or caudad, the ventral sections of the lateral lobes are moderately flaring as seen from the dorsum; concavity of caudal margin, as seen from dorsum, evenly marked, the margin itself quite appreciably rolled cephalad and hence cingulate; lateral lobes with median of the three divisional impressions deeply incised, not quite reaching the subcingulate ventral margin, other impressions apparent but much less evident, on dorsum obsolete mesad.

Tegmina slightly shorter than the median length of pronotum, reaching caudad only to the caudal margin of the proximal abdominal tergite, as seen from dorsum with the lateral and distal outlines strongly arcuate, sutural margin with a rounded rectangulate production at the apex of the stridulating vein, the margin thence proximad straight oblique, and distad shallowly concave to another rounded obtuse-angulation where the sutural margin joins the arcuate distal portion; stridulating field of male type greatly damaged by the insertion of the insect pin, so that much of its venation cannot be described, stridulating vein short, exceedingly stout and greatly inflated, greatest breadth of vein shortly proximad of the anal knot, the axillary vein outlining the tympanum disto-suturad is, as a whole, strong, but near the anal knot it is distinctly thickened and heavier than elsewhere, humeral trunk strongly marked and much inflated.

Abdomen subfusiform, as seen from dorsum definitely tapering distad from a point of greatest inflation at third tergite; distal margin of tergites with the median production evident on all but the two distal ones, and never more than a very weak and blunt obtuse-angulation, which is slightly thickened and subelevated; paired folds markedly developed on all but the four distal tergites, consisting of short ridges, obliquely disposed, ascending cephalad as seen in lateral aspect, with the extremity a free rounded node, the folds becoming obsolete much before the base of each tergite; ultimate tergite with its greatest median length but little more than one-fourth of the total breadth of the tergite, distal margin shallowly concave dorsad of each of the cercal bases, median emargination of same tergite twice as broad as deep, its outline very low and broad U-shaped, the emargination filled with membrane connecting with the supra-anal base; supra-anal plate acuminately lanceolate, longer than broad at base, its apex acute, converging lateral margins slightly sigmoid, dorsal surface of plate broadly but not deeply subconcave excavate within subcingulate lateral margins; cerci nearly twice as long as supra-anal plate, apical hook short but sharply bent inwards, immediate apex acute; subgenital plate with distal breadth less than half that at base, within deeply cupped proximad, dorso-lateral margins strongly concave as seen in lateral view, cingulate, as seen from venter converging subsigmoid distad to distal fourth where they are subparallel, styloid ridges well indicated on ventral surface to near base of plate, less divergent proximad than lateral outlines of plate, their rounded acute pseudostylate extremities subparallel, the distal margin between definitely concave.

Prosternum strongly transverse with lateral sections directed cephalad, completely unspined; mesosternum and metasternum strongly transverse, former four times as broad as long with lateral portions broadly rounded and slightly reflexed, latter more ample and three times as broad as long, broadly arcuate laterad but not at all reflexed.

Cephalic tibiae lacking. Median tibiae with more proximal spines of each dorsal margin sublamellate compressed toward their bases, the series decreasing in length distad, with 4 on the cephalic margin and 5 on the caudal, ventral margins armed distad with 3 cephalic and 5 caudal small adpressed spines in addition to the apical ones. Caudal femora with greatest depth of inflated proximal half equal to approximately one-seventh of the femoral length (as 6.5 to 45), this bullation also evident, but to a lesser degree, from the dorsum, ventral margins, and particularly the external, sublamellately carinate, each distinctly emphasized by a parallel, more dorsal, accompanying linear sulcation, which proximad on the external face broadens to a narrow, ventrad-facing, deplanate area, which in turn is delimited dorsad by another elevated carination, which, however, becomes obsolete mesad, apical spines of the genicular lobes subequal in length: caudal tibiae with 12 external and 13 internal spines on the dorsal (extensor) margins, these larger proximad than distad, all appreciably sublamellately flattened toward their bases and diverging from the tibial axis at angles ranging from 45 to 50°, dorsal surface somewhat impressed within the subcingulate lateral borders and spines, its texture closely granulose, ventral (flexor) margins distad with 4 external and 5 internal spines, all much smaller than those of dorsal surface, closely adpressed and in no way sublamellate, ventral surface shallowly impressed distad, lateral surface sulcately impressed the entire length, two pairs of distal spurs present, the ventral the shorter; caudal tarsi incomplete, third article definitely expanded laterad.

Allotype.— ♀ ; same data as type. [United States National Museum.]

Differing from the preceding description of the male sex in the following noteworthy respects.

Size somewhat larger than in male (body exclusive of ovipositor, 12.2 mm.).

Head somewhat broader, breadth across eyes equal to but twice median length of head, and approximately nine-elevenths of the total depth of the head as seen in cephalic aspect, breadth across genae equal to eight-elevenths of the head depth.

Pronotum as in male except that its sellation is not as pronounced, the recurvature of the cephalic and caudal sections of the disk are less marked and less extensive, and the deplanate median section of the disk covers a greater portion of the whole pronotum, being nearer three-fourths than two-thirds of the dorsal length; in other respects the shape and contour of the whole pronotum and of its margins are essentially as in the male, except that the greatest breadth of the pronotum across the lateral lobes is but slightly greater than the medio-dorsal length of the same (as 52 to 47), with greatest breadth of the pronotal disk mesad (as shown by pattern) equal to but four-sevenths of the greatest breadth of the same caudad, and the concavity of the caudal margin of the disk is less pronounced.

Tegmina less than half as long as the pronotal disk, reaching caudad only to the middle of the proximal abdominal tergite, each definitely broader and shorter proportionately than in male, in outline as seen from dorsum roughly transverse subrectangulate, distal margin transverse truncate, this narrowly rounding into the arcuate costal margin and the subsinuately arcuate sutural margin; humeral trunk moderately inflated but much less so than in male, discoidal and anal fields with a rather coarse network of short veins variously directed (see fig. 6), but in which can be recognized a distinct analogue of the stridulating vein of the male, another a somewhat thickened analogue of the male axillary vein and apparently a narrow and oblong tympanal area.

Abdomen more strongly fusiform than in male; details of development of tergal margins essentially as in male but slightly less strongly emphasized; ultimate tergite with median emargination less evident than in male, but this same section of the tergite clearly submembranous and pulled ventrad toward base of supra-anal plate, which latter is similar to that of male but proportionately broader proximad, its length subequal to proximal width; cerci simple, styliform, tapering, slightly more than twice as long as supra-anal plate, faintly incurving distad; ovipositor valves with their greatest length subequal to that of the cephalic femur, as seen in profile more strongly arcuate proximad than mesad or distad, serrulations of distal portion of ventral margin recurved, while those of the same section of dorsal margin are simple and non-recurved; subgenital plate with median length equal to three-fifths greatest proximal breadth.

Mesosternum as in male but with lateral margins less definitely reflexed; metasternum more strongly transverse and not as deep as in male, this latter dimension contained approximately five times in the metasternal breadth, lateral margins rounded obtuse-angulate instead of broadly rounded as in ♂.

Cephalic tibiae with dorsal (extensor) marginal spines 2 to 3 in number on internal margin and 4 to 5 on external, individually decreasing in length distad in series, ventral (flexor) margins each with a single small spine distad in distal fourth, aside from the apical one. Median tibiae with dorsal margins having 3 cephalic and 5 caudal spines, formed as in ♂, ventral margins each with 2 small spines in their distal half. Caudal femora slightly shorter proportionately than in ♂, greatest depth of inflated proximal portion little more than one-sixth of the femoral length (as 6.5 to 41.5).

Coloration.—Almost completely destroyed, but the following elements of the pattern are still evident by fuscous to prout's brown linings or washes: hour-glass shaped linings of the lateral borders of the disk of the pronotum, a pair of very closely placed parallel medio-longitudinal bars on the metazonal disk, three pairs of "ticking" spots along caudal margin of the pronotal disk, short dashes on external face of each of the paired tergal folds or ridges, plus a definite "ticking" of the distal margins of the tergites, chiefly on the dorsal section between the folds, but also one or more ventrolaterad of the latter; cephalic and median limbs and caudal tibiae each with a considerable number of rather regularly-placed and distinct brownish cloudings, which on both the femora and tibiae are chiefly restricted to the extensor (dorsal) and lateral surfaces, not evident on the flexor ones; caudal femora with a basal, a median and a weak, preapical clouding, the first the most extensive, ventral carinae rather weakly "ticked" with fuscous. Lateral lobes of the pronotum in life apparently are darker than the dorsal disk of the same. Evidence of dark annuli can be seen on the antennae.

Measurements (*in millimeters*): ♂ (*type*); length of body, 11.4 (body somewhat arched); median length of pronotum, 2.4; length of tegmen, 2.2; length of caudal femur, 16.6. ♀ (*allotype*); length of body (exclusive of ovipositor), 12.2; median length of pronotum, 2.6; length of tegmen, 1.1; length of caudal femur, 15.3; length of ovipositor, 6.1.

The type and allotype are all the material of the species which has been examined.

NOTULAE NATURAE

NUMBER 151 OF MARCH 28, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

ON A COLLECTION OF REPTILES FROM ERITREA

BY ARTHUR LOVERIDGE

Curator of Reptiles and Amphibians, Museum of Comparative Zoology

Though our scanty knowledge of the Eritrean herpetofauna has been definitely increased in the present century by the labors of Scortecci and Zavattari, much remains to be done, particularly in working out distributional zones. Few, if any, collections from this region have reached any American museum so it seems worth while recording the receipt of the undermentioned reptiles recently collected by Mr. John W. H. Rehn[1] and presented by him to The Academy of Natural Sciences of Philadelphia.

With the present unrivalled opportunities afforded service men scattered round the world in remote or little-visited localities, it is greatly to be hoped that others may emulate Mr. Rehn's generous action and secure material for the Academy's collection, that knowledge may be increased. It is essential that such specimens should be labelled as to locality, which, in the case of the present collection is Gura, 6400-6800 feet, approximately 30 kilometers south of Asmara. All were taken between June and December 31, 1942.

Chamaeleo basiliscus Cope

Chamaeleo basiliscus Cope, 1868, Proc. Acad. Nat. Sci. Philadelphia, p. 316: "Korusko, Nubia" i.e. Korosko, Anglo-Egyptian Sudan.

♀ (A.N.S.P. 25201). Total length 271 (145 + 126) mm.

---

[1] Research Associate, Department of Insects, Academy of Natural Sciences of Philadelphia. Now serving overseas in the Sanitary Corps, A.U.S.

Typhlops blanfordii blanfordii Boulenger

Typhlops Blanfordii Boulenger, 1889, Ann. Mag. Nat. Hist., (6), IV, p. 363: "Senafe, Ethiopia" i.e. Senafe, Eritrea.

♂ ♀ (M.C.Z. 47032 and A.N.S.P. 25202). Midbody scale-rows 30; midbody diameter 10.5 mm. for both; diameter included in total length 30.4 (♂) and 32.6 (♀) times; tail included in total length 49 (♂) and 64 (♀) times. Total length of ♂, 343 (336 + 7) mm., of ♀, 320 (315 + 5) mm. Median line of belly whitish in ♂, uniform with dorsum in ♀.

Gura is less than 60 km. north of the type locality of *blanfordii,* for which trinomials are necessary on account of the race *lestradei* inhabiting the Central African highlands. I am of the opinion that most, if not all, Eritrean records of "*punctatus*" will, on re-examination, be found referable to *blanfordii,* for there is much overlapping of characters. That of the rostral being half (*blanfordii*) or more than half (*punctatus*) the width of the head—the principal character employed by Boulenger (1915, Proc. Zool. Soc. London, p. 641) fails in practice, being within the range of variation of both species.

In my experience *punctatus* is a blind-snake of the virgin rain-forest, or recently deforested areas, whereas *blanfordii* appears to be an upland form without sylvicoline association. They may be separated as follows:

Snout rounded with obtusely angular horizontal edge; midbody scales in 26-30 rows; midbody diameter 24-36 times in total length........................*p. punctatus*

Snout rounded without obtusely angular horizontal edge; midbody scales in 30 rows; midbody diameter 30-40 times in total length........................*b. blanfordii*

Philothamnus semivariegatus semivariegatus Smith

Philothamnus semivariegatus A. Smith, 1849, Ill. Zool. S. Africa, Rept., pls. lix, lx, lxiv: "Bushman's Flats and Kurrichane" i.e. Rustenberg District, Transvaal.

♂ juv. (A.N.S.P. 25203). Midbody scale-rows 15; ventrals 217; anals 2; subcaudals 140; upper labials 9, the fifth and sixth entering the orbit; preocular 1; postocular 1; temporals 2 + 2. Total length 386 (280 + 106) mm.

Whether Spotted Wood-snakes from the northeasterly limits of their range should be referred to the typical form seems questionable. The matter can be settled only after a thorough revision of the genus, however, for there is an extensive synonymy.

Coluber florulentus florulentus Geoffroy Sainte-Hilaire

Coluber florulentus Geoffroy Sainte-Hilaire, 1827, Descr. Égypte, Rept., p. 146, pl. viii, fig. 2: Egypt.

♂ (A.N.S.P. 25204). Midbody scale-rows 21; ventrals 195; anals 2;

subcaudals 99; upper labials 9, the fifth and sixth entering the orbit; preocular 1 (over a subocular); postoculars 2; temporals 2 + 2. Total length 625 (458 + 167) mm.

Trinomials are necessary if the closely related *smithi* (Boulenger) of the Somali-Kenya coastlands, is regarded as a subspecies.

Psammophis subtaeniatus sudanensis Werner

Psammophis subtaeniatus var. *sudanensis* Werner, 1919, Denks. Akad. Wiss. Wien, XCVI, p. 504: Kadugli, Anglo-Egyptian Sudan.

Juv. (A.N.S.P. 25205). Midbody scale-rows 17; ventrals 164; anals 2; subcaudals 107; upper labials 8, the fourth and fifth entering the orbit; preocular 1; postoculars 2; temporals 1 + 2. Total length 305 (218 + 87) mm.

This constitutes the first record of the occurrence of the Northern Stripe-bellied Sand-snake in Eritrea, though known from Ethiopia. The typical form is found chiefly south of the Zambesi.

Naja haje haje (Linné)

Coluber haje Linné, 1762, in Hasselquist, Reise Palest., p. 386: Lower Egypt.

♂ (A.N.S.P. 25206). Midbody scale-rows 21; ventrals 206; anal 1; subcaudals 54; upper labials 7, excluded from orbit, sixth largest; preocular 1; postoculars 2; temporals 1 + 1. Tail length 250 mm.

This adult Egyptian Cobra over five feet in length (body skinned out) is dark brown above, the head uniform but the body and tail freely sprinkled with cream-colored scales. Below, creamy white with extensive series of ventrals dusky, the subcaudals mottled with dusky brown.

Naja nigricollis nigricollis Reinhardt

Naja nigricollis Reinhardt, 1843, Dansk. Vidensk. Selsk. Skrift., X, p. 269, pl. iii, figs. 5 and 7: Guinea, West Africa.

♀ juv. (A.N.S.P. 25207). Midbody scale-rows 25; ventrals 218; anal 1; subcaudals 61; upper labials 7, the fourth entering the orbit; preoculars 2; postoculars 3; temporals 2 + 5. Total length 390 (326 + 64) mm.

This young Black-collared Cobra is uniformly olive brown above, except for two black bands on neck (approximately on rows 4-7 and 16-19); head somewhat darker on crown, almost white on sides where a black streak extends from eye to lip. The lower lip is mostly edged with black in a curious way; the first 8 ventrals on the throat are white, numbers 9-16 black, 17-20 white, 21-30 mainly black.

Bitis arietans (Merrem)

Vipera arietans Merrem, 1820, Vers. Syst. Amphib., p. 152: Cape of Good Hope, i.e. Union of South Africa.

Two skins (A.N.S.P. 25208 and M.C.Z. 47033). Midbody scale-rows 31; ventrals 134 — 136; anal 1; subcaudals 21 and ?. Tail lengths 45 mm. and ? (tip missing).

The common Puff Adder, ranging from southern Morocco to the Cape, has defied all attempts to separate it into geographical races.

NOTULAE NATURAE

NUMBER 152 OF APRIL 4, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW SNAIL FROM THE DEVONIAN HAMILTON GROUP

BY B. F. HOWELL

Curator of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia

In the year 1840 T. A. Conrad[1] described from Lower Devonian beds in Albany and Schoharie counties, New York, a peculiar spiniferous snail which he named *Platyceras dumosum.* He stated that this snail was also found in the Middle Devonian Moscow Shale of Livingston County, in the same state. In 1879 James Hall,[2] in discussing a new variety of this species, *P. dumosum rarispinum,* which he was describing from the Lower Devonian of New York, stated that the snail in the Middle Devonian beds of Livingston County which Conrad had referred to *P. dumosum* was not that species, but a distinct variety, smaller than *P. dumosum rarispinum;* but Hall did not describe this small form or give it a name. As far as the writer has been able to determine this small Middle Devonian snail, which occurs in beds now referred to the Hamilton Group, has remained unnamed until the present day. A formal description and name are therefore presented below.

GASTROPODA

PROSOBRANCHIA

ARCHAEOGASTROPODA

Trochonematacea

PLATYCERIDAE

Platyceras parvispinum new species Figs. 1-3.

Platyceras dumosum Conrad (in part), Ann. Rept. New York Geol. Surv., 1840, p. 206 (Moscow shale occurrence).

Platyceras dumosum var. Hall, Natural History of New York. Palaeontology, vol. 5, pt. 2, 1879, pp. 16-17.

---

[1] Ann. Rept. New York Geological Survey, 1840, pp. 205-206.

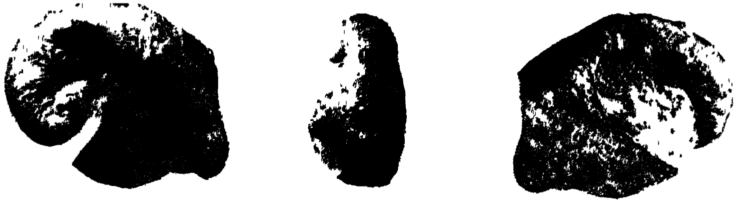
[2] Natural History of New York, Palaeontology, vol. 5, pt. 2, 1879, pp. 16-17.

Shell small for a *Platyceras*, with a wide aperture, back of which the diameter rapidly decreases, so that the rather closely coiled apex is very small. Two or three volutions. Surface marked by undulated concentric growth-line striae and twelve or more spines. As only the bases of the spines are preserved and the outer edge of the shell is broken away around the edge of the aperture in the single specimen examined by the writer, the length of the spines and the form of the aperture cannot be stated here. However, the direction of the growth-line striae and a depression in the right side of the shell, extending for some distance back from the margin of the aperture, indicate that there was a sinus in the right margin, and the direction of the growth-line striae on the crest line of the shell seems to mark the position of a sinus in that part of the margin also.

Location of type.—The holotype is A.N.S.P. 16576.

Formation and locality.—Gray shale of the Middle Devonian Hamilton Group, exact formation not recorded, presumably from New York or Pennsylvania, but exact locality not known.

Discussion. — This species resembles *Platyceras dumosum rarispinum* Hall in the number of its spines, but is very much smaller and more tightly coiled and the spines on its shell are less in diameter. It is possible that the holotype is the shell of a young individual; but it is not probable that adult shells of this species approached the size of the shells of *P. dumosum rarispinum* Hall, for Hall stated that the Middle Devonian form was smaller than his subspecies and the shells of *P. dumosum rarispinum* that he figured are three times as large as our holotype.



1 2 3

Platyceras parvispinum new species. Fig. 1.—Right side view, × 2. Fig. 2.—Same front view, × 2. Fig. 3.—Same, diagonal left side view, showing aperture, × 2.

NOTULAE NATURAE

NUMBER 153 OF MAY 23, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON COLOMBIAN ANTBIRDS, OVENBIRDS, AND WOODHEWERS, WITH THE DESCRIPTION OF A NEW FORM FROM PERU

BY RODOLPHE MEYER DE SCHAUENSEE

Curator of Birds, The Academy of Natural Sciences of Philadelphia

In the following paper notes on the Academy's Colombian collection of birds are continued.[1] In it six new forms are described, five from Colombia and one from Peru.

My thanks are due to Dr. Alexander Wetmore of the United States National Museum and Dr. J. T. Zimmer of the American Museum of Natural History, for their kindness in allowing me to consult the collections in their charge.

Frederickena unduligera fulva Zimmer

The Colombian record for this species has rested until recently on a single specimen from La Morelia, recorded by Chapman as *Taraba unduliger*. The species now has been split by Zimmer into four races (Amer. Mus. Novit., no. 1263, pp. 1-4, 1944). The present form inhabits the tropical zone at the east foot of the East Andes in Colombia and Ecuador (type from Ecuador).

Von Sneidern secured three males and three females at La Morelia.

Thamnophilus aethiops wetmorei new subspecies

TYPE.—♂ ad., A.N.S.P. no. 152418, collected at La Morelia, Caquetá, southeastern Colombia, by Kjell von Sneidern on October 18, 1941.

Description.—Closest to *Th. a. polionotus* Pelzeln of the Rio Negro, Brazil, and upper Orinoco, Venezuela, but darker gray above, and especially so below where the color becomes blackish gray. Lower parts close in color to those of *Th. unicolor grandior* Hellmayr, but somewhat darker. Differs from *Th. a. aethiops* Sclater of eastern Ecuador by having the body plumage, deep dull gray instead of uniform black, and by having white apical spots to all the upper wing-coverts.

---

[1] Funds for this collection have been supplied by the American Philosophical Society, Charles M. B. Cadwalader and the author.

Measurements of type.—Wing 73, tail 50, culmen 17 mm.

Range.—Known only from southeastern Colombia.

Remarks.—The female of this form differs markedly from the female of *polionotus*, by having the mantle much paler, which makes the rufous cap stand out more clearly from the rest of the upper parts. Below, it is also paler, but not so markedly as on the mantle. The tail is not blackish as in *aethiops* but brown as in *polionotus*. It is interesting that this form should be closer to birds from the upper Orinoco and Rio Negro than to the more geographically close eastern Ecuador birds.

This new form is interesting because it bridges the color gap between the black *aethiops* and all its gray subspecies. Birds from the Cassiquiaré, Rio Maturaca, Brazil-Venezuela line, São Gabriel and Cucuhy on the Rio Negro, Rio Canabury, Amazonas, and Cerro Yapacani, upper Orinoco, of which I have examined 15 males and 10 females, show that males are uniformly lighter gray, females darker on the mantle than three males and a female from La Morelia.

The species is new to the Colombian avifauna.

As already pointed out (Zimmer, Amer. Mus. Nat. Hist. Novit. 646, p. 19, 1933) the bird described by Chapman as *Thamnophilus aethiops occidentalis* from western Colombia, in reality is *Dysithamnus o. occidentalis*.

I have named this bird in honor of Dr. Alexander Wetmore, of Washington.

Megastictus margaritatus Sclater

The distribution of this handsome species is curiously disconnected. Four specimens from La Morelia show the bird to inhabit eastern Colombia, a considerable extension of the bird's range northward along the east foot of the Andes.

Myrmotherula obscura Zimmer

Amer. Mus. Novit., no. 523, p. 2, 1932 (mouth of the Rio Curaray, eastern Ecuador).

Although the tip of the bill is missing, a specimen secured at Belén obviously belongs to this species. In addition to its very small bill, it shows the broad mystacal band and dark back ascribed to this species. It has been compared with Ecuadorean examples.

The species has not been recorded before from Colombia. At nearby La Morelia a female of *M. b. brachyura* was taken. The latter had the iris dark brown, while in *obscura* it is noted as black, otherwise the soft parts are similar.

Myrmotherula hauxwelli suffusa Zimmer

Amer. Mus. Novit., no. 523, p. 11, 1932 (Rio Suno, E. Ecuador).

Zimmer gives the range of this form as " Eastern Ecuador and adjacent parts of Peru north of the Marañon and Amazon " (loc. cit. p. 11), but on p. 13 birds from " Bogotá," Villavicencio and La Morelia are included under *suffusa.*

An adult and an immature male were secured by von Sneidern at Belén.

Myrmotherula fulviventris salmoni (Chubb)

This name was given by Chubb (Ann. Mag. Nat. Hist., II, 1918, p. 124), to a bird from Remedios, Antioquia, on the west side of the Magdalena Valley. He, for some reason, included Ecuador in the range, and partially because of this, and because nobody seems to have seen Magdalena Valley birds, the name has been relegated to synonymy.

Magdalena birds, as represented by five specimens in the Academy's collection from El Tambor, on the east side of the river in the state of Santander, are different from Panama, west coast of Colombia and western Ecuador birds (type from Lion Hill, Panama).

Some of the characters given by Chubb are not apparent, but the following ones hold good: more buffy and paler underparts; throat in males whiter, the black not nearly so apparent, and the wing-coverts pale brown, not blackish brown. In addition Magdalena birds have longer tails.

Forty-nine specimens from Gatún, Panama; Garachiné, Darien; Rio Salaquí, Rio Juradó, Rio Baudó, Alto del Buey, Potedó, Malagita, Quibdó, Andagoya, La Costa, western Colombia; and Bucay, western Ecuador have been examined. These all belong to the typical form and show great variation as to the color of the upper and underparts, but none has pale wing-coverts and as white a throat as *salmoni.*

The tails of 33 western specimens measure 30-35.5 mm. (average 32.5) as against 37-39.5 (average 37.5) for five El Tambor birds.

I have not seen birds from the west bank of the Magdalena, but as these from El Tambor have characters corresponding to those in the original description of *salmoni,* Chubb's name must be revived.

Of course the range must be limited to the forested section of the northern portion of the Magdalena Valley. Cauca Valley birds, which I have not seen, are, according to Hellmayr, referable to the nominate form.

A male and a female from Eden, Nicaragua have tails of 35 and 30 mm. These belong to the form described by Todd from Costa Rica as *Myrmotherula fulviventris costaricensis. Myrmotherula fulviventris viduata* Hartert described from Ecuador, is not recognizable.

Myrmotherula haematonota pyrrhonota Sclater & Salvin

Zimmer, with quantities of material, has shown this to be a perfectly recognizable form (Amer. Mus. Novit., no. 523, p. 14, 1932).

Von Sneidern secured a male at La Morelia. The only previous record for Colombia is another male also secured at La Morelia and recorded as *Myrmopagis haematonota* (Sclater).

Myrmotherula longipennis longipennis Pelzeln

With a single male from La Morelia Zimmer (loc. cit. no. 524, p. 12) rather hesitatingly called it *longipennis*. Two males from La Morelia are intermediate between *longipennis* and *zimmeri* Chapman of Eastern Ecuador. A female, however, is entirely different from the female of *zimmeri* and below is like pale extremes of *longipennis*, with the back somewhat less olive, more foxy.

Herpsilochmus sticturus dugandi new subspecies

TYPE.—♀ ad., A.N.S.P., no. 152152, collected at Belén, (600 ft.), Caquetá, southeastern Colombia, on December 22, 1941, by Kjell von Sneidern.

Description.—Immediately distinguishable from *sticturus* of the Guianas to central Venezuela by having the entire crown and nape dull rufous instead of black streaked with rufous anteriorly. Below much more buffy.

Measurements of type.—Wing 49.5, tail 30.5, culmen 12.5 mm.

Range.—Known only from the type locality which is near La Morelia in southeastern Colombia.

Remarks.—Although I have but a single female of this new bird I do not hesitate to describe it, as it is so different from the female of *sticturus*.

The genus *Herpsilochmus* is roughly divisible into two groups: those with gray backs and whitish underparts in which the females have black crowns streaked or spotted with white or rufous, and those with green upper parts and yellow lower parts in which the females have solid rufous crowns. The present bird is particularly interesting in that it belongs to the gray-backed section, but has a solid rufous crown and nape, thus in a way connecting the two types of *Herpsilochmus*. *Herpsilochmus stictocephalus* Todd, from French Guiana, is apparently very similar to *sticturus* but the female has the crown spotted with white and is therefore more unlike *dugandi* than is *sticturus*.

As the female of *dugandi* is so very different from the female of *sticturus* it will be most interesting to see what the male of *dugandi* looks like.

This new bird is named in honor of Dr. Armando Dugand, Director of the Institute of Natural Sciences of the National University of Colombia.

Terenura callinota peruviana new subspecies

TYPE.—♂ ad., A.N.S.P. no. 115246, collected at the Rio Jelashte, Dept. of San Martín, Peru, on August 8th, 1932, by M. A. Carriker, Jr.

Description.—Similar to *T. c. callinota* (Sclater) of Colombia, but breast, especially the lower part of it, tinged with yellowish green instead of plain pale grayish, the breast consequently less sharply defined from the greenish yellow underparts.

Measurements of type.—Wing 59, tail 46, culmen 11.5 mm.

Range.—Northern Peru south to Junín.

Specimens examined.—*T. c. callinota;* ♂, ♀, La Candela, west slope of the Central Andes; ♂, Rio Munchique, west slope, West Andes; ♀, Ricaurte, southwestern Colombia; ♀, Mayasquer, southwestern Colombia. *T. c. peruviana;* 2 ♂, 2 ♀, Rio Jelashte, ♀, Eneñas, Junín.

Remarks.—*Terenura callinota* was described from "Bogotá," therefore I take the birds from the head of the Magdalena to properly represent the nominate form. The three birds from the west coast of Colombia are not entirely like those from the Magdalena Valley and possibly represent still another form.

The male differs from the one from La Candela by having more black on the upper back, and the females by having the crowns more brownish, less gray. They are also smaller than La Candela and Peruvian birds, with the exception of the one from Junín.

They measure as follows: ♂, wing 53, tail 41, ♀ ♀, wing 51.5, 52.5, tail 40, 41.5 mm. Specimens from other localities measure as follows: La Candela ♂, wing 56.5, tail 45, ♀, wing 54, tail 46. Rio Jelashte, ♂ ♂, wing 59, 59, tail 47, 48.5, ♀ ♀, wing 54.5, 55, tail 44.5, 48, Eneñas, ♀, wing 52.5, tail 43.5.

Terenura spodioptila signata Zimmer

An adult female was collected at La Morelia adding this rare species to the Colombian avifauna. The specimen agrees minutely with the original description of this subspecies.

Sipia rosenbergi (Hartert)

An immature male of this scarce bird differs from the adult by having the lower back and belly, and upper and under tail-coverts dull rufous-brown. For other remarks on the plumages of this species see Bond and de Schauensee (Proc. Acad. Nat. Sci., 92, pp. 160-1, 1940).

Phlegopsis erythroptera (Gould)

A male was secured at Belén, Caquetá. The species was not represented in the Academy's collection.

Grallaricula cucullata (Sclater)

Two examples of this very rare bird were secured at La Candela. It is known from a handful of localities in the Subtropical Zone of the three Andean chains in Colombia.

Grallaria milleri Chapman

Two specimens were secured at Laguneta. To the present time this species is known only from the above locality in the Temperate Zone on the west slope of the Central Andes. Obviously it must be of very restricted distribution.

Grallaria hypoleuca castanea Chapman

Four birds from La Candela are closest to this form, which has not been recorded from Colombia before. A female (A.N.S.P. 155851) is just as rufescent above as a specimen in the Academy's collection from above Sumaco and even " redder " than a bird from Baeza (topo-type) in the collection of the United States National Museum.

The others are not quite as bright, but are not as dull as *G. h. hypoleuca.*

Xenornis setifrons Chapman

This bird has been known from but three examples, all males, collected at Tacarcuna, 2050 ft., (type), Permé, and Obaldia, Darien. The first known females were collected by von Sneidern, at the Rio Baudó, (1800 ft.), Chocó, Colombia, thus adding the genus to the avifauna of that country.

As the female was unknown, a description of it is here given.

Upper parts, including forehead and sides of head, ochraceous-tawny. Primaries and secondaries blackish brown edged with ochraceous-tawny. Tail blackish brown. Feathers of the chin and upper throat whitish edged with dusky, throat and breast ochraceous tawny, paler than the back, the feathers edged with brownish. Breast more uniform pale wood-brown. Center of abdomen grayish, flanks dark wood-brown. " Iris gray, lower mandible yellowish-gray, feet and legs grayish black."

The male differs from the female by having the forehead, sides of head, auriculars and under parts deep neutral gray, the wing-coverts tipped with ochraceous-salmon.

Cinclodes fuscus paramo new subspecies

TYPE.—♂ ad., A.N.S.P. no. 150810, collected above Mayasquer (11,400 ft.), Nariño, southern Colombia, by Kjell von Sneidern on October 3, 1941.

Description.—More or less intermediate between *C. fuscus albidiventris* Sclater, of Ecuador and *C. fuscus oreobates* Scott, of Santa Marta and the northern end of the East Andes. From *albidiventris* it differs by having the back less rufescent, (as in *oreobates*), and in having the central tail feathers decidedly grayer, less brown. From *oreobates* it differs by having a shorter wing and bill (the same size as *albidiventris*).

Measurements of type.—Wing 100.5, tail 67, culmen 10.5 mm.

Range.—The Paramo Zone of the mountains of southwestern Colombia.

Material examined.—*C. f. albidiventris,* ♂, Chimborazo (type locality), 2 ♂, ♀, Pichincha; *C. f. paramo,* 2 ♂, 2 ♀, Cumbal, Chiles, southwestern Colombia. *C. f. oreobates,* 3 ♂, 2 ♀, Lagunillas, Boyacá; Paramo de Macotama, Santa Marta, Colombia.

Wing measurements of material examined.—Pichincha, 2 ♂, 97, 103, ♀, 95, Chimborazo, ♂, 97, Cumbal, ♂, 97, Mayasquer, ♂, 100.5, Chiles, ♂, 105, ♀, 94. Lagunillas 2 ♂, 107, 108, 2 ♀, 97.5, 99.5, Macotama, 3 ♂, 107, 108, 108, 2 ♀, 103.5, 106 mm.

Remarks.—The southwestern Colombian birds are interesting, for they help to fill a gap in the known range of the species. Previously the species was known from northern Colombia and Venezuela with its nearest known relative far to the south in Ecuador.

Although this race could never be called a very striking one, due to the " insular " distribution of this species, it seems well worth describing.

Cinclodes excelsior excelsior Sclater

Three specimens were secured above Mayasquer and on Cumbal (11,100-12,600 ft.). Because of their slender bills and their buffy underparts, they are referable to the nominate form which has not previously been recorded from Colombia.

Cinclodes excelsior columbiana (Chapman)

Three birds were secured on the Nevado de Tolima. Previously the race was known only from the Paramo of Santa Isabel.

The discovery of typical *excelsior* in southwestern Colombia helps bridge the distributional gap between the two forms as it does in the case of *Cinclodes fuscus.*

This species does not fit well into the genus *Upucerthia,* and Carriker (Proc. A.N.S.P., 84, p. 1, 1932), says, speaking of *excelsior* and his *aricomae,* "their flight and habits are exactly like those of *Cinclodes,* especially the manner of flight which is very characteristic and totally unlike the various forms of *Upucerthia* which I have studied in the field." I believe *Upucerthia aricomae* Carriker to be a well marked subspecies of "*Upucerthia*" *excelsior* both of which should be transferred to the genus *Cinclodes.*

Leptasthenura andicola andicola Sclater

This is the only species of *Leptasthenura* found in Colombia and there are but few recorded localities in that country for this form. We have a single specimen from the Nevado de Tolima (12,000 ft.).

Synallaxis moesta obscura Chapman

This form was previously known only from the two original specimens collected at La Morelia. Von Sneidern has secured two more at the type locality and they show very clearly the characters of this race.

Synallaxis subpudica Sclater

We have specimens from Bogotá, (one), and Peña Blanca, Santander (eight).

Stone's record (Proc. Acad. Nat. Sci., 51, p. 306, 1899), from Ambalema should be referred to *S. albescens insignis* Zimmer.

Synallaxis albescens insignis Zimmer

Amer. Mus. Novit. 861, p. 16, 1936 (Quetame, Eastern Andes of Colombia).

We have specimens of this form from La Colorada, Boyacá; Lorica, Bolivar; Ambalema, Magdalena Valley, and Yumbo in the Cauca Valley. The latter are very close to East Andean birds.

Synallaxis albescens (? hypoleuca)

Two specimens from Soatatá, near the mouth of the Atrato, are warmer in tone above, and whiter below than *insignis.* They clearly belong to another form, probably *hypoleuca,* but I have been unable to find specimens of the latter to compare them with.

Synallaxis rutilans caquetensis Chapman

Known heretofore from three specimens from Florencia, Caquetá. Von Sneidern secured three more at La Morelia.

Asthenes flammulata flammulata (Jardine)

A single male from Mayasquer (11,000 ft.) adds this form to the Colombian avifauna. It has been compared with a series from Ecuador with which it agrees minutely, and shows no approach to *quindiana* Chapman, of which we have a series from the Nevado de Tolima (12,000 ft.).

Siptornis striaticollis Reichenbach

Three specimens of this bird were secured at La Candela. It has been recorded from but few localities and appears very local in distribution.

Margarornis stellata Sclater and Salvin

A female was secured by von Sneidern at Ricaurte (3900 ft.). It appears to be very rare and has been recorded from but few localities in western Ecuador and western Colombia.

Ancistrops strigilatus (Spix)

Eight specimens were secured at Belén and La Morelia. Recorded by Chapman from southeastern Colombia when a single bird was secured at the latter locality.

Syndactyla subalaris mentalis (Taczanowski and Berlepsch)

Chapman, in his book on Colombian birds, refers specimens from La Candela to the above form while Hellmayr and Zimmer call them *striolata* Todd. I believe Chapman to be right, for two birds from La Candela and El Isno, at the head of the Magdalena, agree with a bird from Sumaco, East Ecuador, in having a blackish pileum and small gular patch.

Probably birds from the Bogotá region are referable to *striolata*. This is another instance in which birds from the head of the Magdalena Valley are similar to east Ecuadorean birds.

Syndactyla subalaris subalaris (Sclater)

We have five specimens of this form from Rio Munchique (2700 ft.) and Ricaurte (3900 ft.) all of which agree well together.

One specimen from La Cumbre on the summit of the western Andes (about 5000 ft.) is intermediate between this form and *mentalis*. It is either an individual variant, or possibly may have been taken below La Cumbre on the Cauca Valley side, in which case it might be that Chapman's *columbianus* described from Miraflores is a valid race.

Anabacerthia striaticollis temporalis (Sclater)

This very distinct form appears to inhabit the tropical zone of the Pacific coast of Colombia and Ecuador.

Above the coast at La Cumbre it is replaced by *A. s. striaticollis*, for we have a series of typical specimens from there, at an altitude of about 5000 ft. Other specimens of *striaticollis* are from La Candela (5500 ft.), El Isno (5500 ft.), Salento (5000 ft.), Munchique (5700-6600 ft.).

Chapman, in his birds of Ecuador records *temporalis* as a subtropical form but we have a specimen from the juncture of the Chanchan and Chiguancay Rivers (2000 ft.), and he records three males from La Chonta (2000 ft.), and the junction of the Chota and Chimbo (2425 ft.). The other localities given are at the lower edge of the subtropical zone, and just above tropical valleys of easy access, for instance Mindo (4,140 ft.), and El Chiral (5350 ft.) but collecting there was done as low as 4000 ft.

Bangs has shown that *striaticollis* Lafresnaye (1840), not of Sclater (1857), is the correct specific name for this group. (Bull. Mus. Comp. Zool., 70, 1930, pp. 251-252.)

Philydor erythropterus (Sclater)

A female was secured at La Morelia. Although described from Bogotá, as far as I know, this is the first Colombian specimen with a definite locality. It appears to be a comparatively rare but wide ranging species.

Automolus infuscatus infuscatus Sclater

A male was secured at La Morelia.

Automolus dorsalis Sclater and Salvin

A male was taken at La Morelia and an immature male at Belén. The latter has the crown tinged with rufous, as is the postocular stripe. The pale underparts show remains of a rufous wash.

Automolus ochrolaemus pallidigularis Lawrence

Two females were secured at Juradó.

Automolus ochrolaemus turdinus (Pelzeln)

Two males were collected at La Morelia.

Thripadectes virgaticeps magdalenae new subspecies

TYPE.—♂ ad., A.N.S.P. no. 155488, collected at La Candela, east slope of the Central Andes (5000 ft.), Colombia, by Kjell von Sneidern on August 30th, 1942.

Description.—Differs from *T. v. sclateri* Berlepsch by smaller size, by having the feathers of the throat less strongly margined with black, thus presenting a less streaked appearance, and the under surface more golden brown, thus brighter. Upper parts slightly more olive.

Measurements of type.—Wing 94, tail 87, culmen 22 mm.

Range.—Known only from the head of the Magdalena Valley.

Additional measurements.—Another male (possibly a female) of *magdalenae* from the same locality measures, wing 93.5, tail 89, culmen 19 mm. A male and female of *sclateri* from Ricaurte measure, wing, ♂ 101, ♀ 94.5, tail ♂ 94.5, ♀ 91, culmen ♂ 25.5, ♀ 24.5 mm.

Remarks.—It is most interesting to find this bird in the Magdalena Valley. Hitherto *virgaticeps* and *sclateri* have been known only from western Ecuador and western Colombia, while the only other known race is *klagesi* (Hellmayr and Seilern), apparently isolated in northwestern Venezuela. The present specimens from the Magdalena fill a step in this distributional gap.

Of the known forms *virgaticeps* is the largest with a bill of 28-30 mm., next *sclateri* with a bill of 23-27 mm., then *magdalenae* with a bill of 19-22 mm.

The far removed *klagesi*, which I have not seen, is said by Hellmayr to have a bill of 24 mm., and the throat more heavily marked with blackish than *sclateri*. In *magdalenae* these markings are less pronounced.

Thripadectes holostictus holostictus (Sclater and Salvin)

There appear to be no records of this form from the Western Andes of Colombia, so it is well to record a series secured by von Sneidern on both slopes of that range at Munchique. They agree well with Central Andean specimens.

Birds from Mayasquer, Nariño, differ slightly from the typical form and should be referred to the following subspecies.

Thripadectes holostictus striatidorsus (Berlepsch and Stolzmann)

This form described from western Ecuador can be distinguished by its more rufescent underparts, and the dark edges to the feathers of the throat and breast, less black more brownish. It is a perfectly recognizable form. *T. h. moderatus* Zimmer is still brighter below and the pale streaks on the chest are narrower.

Xenops minutus remoratus Zimmer

Amer. Mus. Novit., No. 862, 1936, p. 22 (Tatú, Rio Negro, Brazil).

Two specimens from La Morelia and Belén, definitely are not *obsoletus*. They agree fairly well with two Cassiquiaré specimens, a locality from which birds are said by Zimmer to be intermediate between this race and *ruficaudatus*.

The race *remoratus* has been recorded from the Colombian bank of the Uaupés opposite Tahuapunto, Brazil.

Xenops minutus neglectus Todd

A single specimen from El Tambor, Santander, west slope of the East Andes is inseparable from a series from Santa Marta, showing that this is the form found on the upper Magdalena, and not *littoralis*.

Xenops tenuirostris acutirostris Chapman

A female secured at Belén, Caquetá adds this species to the avifauna of Colombia.

Sclerurus guatemalensis salvini Salvadori

As surmised by Hellmayr (Bds. Amer., XIII, ft. note, p. 256, 1925) birds from the west coast of Colombia belong to this form.

We have a series from the Rio Juradó and Rio Jurubidá.

Lochmias nematura subspecies

A single specimen from Munchique (5700 ft.) does not agree with any known form. It is grayer below than four specimens of *sororia*, with which I have compared it, and also grayer below than the type and three additional specimens of the recently-described *nelsoni* Aldrich, from eastern Darien. From both the above-mentioned forms it differs further by having smaller white spots on the throat. It undoubtedly represents a new subspecies, but as the bird is not fully adult and as I have but a single specimen, the wisest course seems to leave it unnamed. *Lochmias nematura* has not been recorded previously from the Western Andes.

Dendrocolaptes certhia radiolatus Sclater and Salvin

Von Sneidern secured five specimens at La Morelia. Previously it was known in Colombia from a single specimen from Florencia. These specimens agree with two from East Ecuador.

Dendrocolaptes picumnus validus Tschudi

A pair from La Morelia agree closely with Peruvian examples of this race. West of the Andes in Colombia *D. p. multistrigatus* occurs. It is less brightly colored.

Dendrexetastes rufigula devillei (Lafresnaye)

Not previously recorded from Colombia. A pair from La Morelia have the streaking on the chest reduced to a minimum but can be matched by Ecuadorean examples.

Dendroplex picus saturatior Hellmayr

Two females from La Morelia are probably of this race. They are dark in color and have tail of 85-88 mm. Hellmayr gives the tail measurement for this race as 82-89 mm. In nine specimens of *picus* the tails measure 74, 75, 77 (3), 78, 78.5, 80.5, 81 mm. The tail in *duidae* is given by Zimmer as 74 mm.

Xiphorhynchus ocellatus napensis Chapman

Four specimens from La Morelia agree with one from the type locality in Eastern Ecuador.

This race has not previously been recorded from Colombia.

Xiphorhynchus spixi ornatus Zimmer

Amer. Mus. Novit., no. 756, 1934, p. 7 (Puerto Indiana, Peru).

A bird from Florencia is recorded by Zimmer as belonging to this form. We have two from La Morelia.

Lepidocolaptes lacrymiger sneiderni new subspecies

TYPE.—♂ ad., A.N.S.P. no. 144361, collected at El Tambo, (Munchique) 6000 ft., east slope of the Western Andes, Cauca, Colombia, by Kjell von Sneidern on July 25, 1938.

Description.—Differs from *L. l. lacrymiger* (Des Murs) of Bogotá, and the northern portion of the Eastern Andes principally by the different shape of the white streaks on the lower surface. These markings are less numerous and much narrower than in the nominate form. Further, they are more drop-shaped, that is, expanding more abruptly at their apex, with a heavier black border at the rounded end. The character of these white markings gives almost a spotted, rather than a streaked appearance to the lower surface. The ground color of the entire underparts is darker, the streaks on the flanks less conspicuous. Upper surface, including rump and upper tail-coverts somewhat darker.

L. l. aequatorialis (Ménégaux) is closer to *lacrymiger* than it is to *sneiderni* in the shape of the white marks on the lower surface. It also looks streaked rather than spotted. In addition to the shape of the markings it differs from *sneiderni* in being more rufescent both above and below.

Measurements of type.—Wing, 111, tail 92, culmen 24 mm.

Range.—East slope of the Western Andes from the headwaters of the Rio Patia northward; Central Andes, both slopes from the headwaters of the Magdalena and the head of the Cauca Valley, northward; west slope of the Eastern Andes at the head of the Magdalena Valley.

Material examined.—*Lepidocolaptes lacrymiger sanctae-martae* (Chapman), 2 ♂, ♀ Cincinnati; 2 ♀, Las Vegas. *L. l. lacrymiger* (Des Murs), 2 o, Bogotá; 5 ♂, 3 ♀, Ramirez, Santander. *L. l. sneiderni,* 8 ♂, 5 ♀, El

Tambo, (Munchique); ♂, ♀, San Antonio; Western Andes, 3 ♂, ♀, Coconuco; 9 ♂, 9 ♀, La Candela; 2 ♂, ♀, Buena Vista, (Huila), ♂, o, San Agustín; 2 ♂, Salento; 8 ♂, 6 ♀, Laguneta; 2 ♂, 5 ♀, Toché. *L. l. aequatorialis* (Ménégaux) 6 ♂, 5 ♀, Ricaurte, southwestern Colombia; 2 ♂ Pagma Forest, western Ecuador.

Remarks.—It is curious that so well marked a form of *lacrymiger* has not been described before. With ample material from Colombia, Peru and Bolivia the West and Central Andean form, here described, stands out clearly from all the others by the more drop-shaped white markings which in all other forms are not so sharply expanded at the extremity, thus more linear.

Birds from the east slope of the Central Andes show only a very slight approach to East Andean specimens.

Des Mur's plate of *lacrymiger* (Iconog. Orn., pl. 71, 1849) is rather unsatisfactory, for it shows only a side view of the bird, thus the breast is mostly concealed. It agrees with East Andean birds in having the flanks heavily streaked, where in *sneiderni* these streaks are obsolescent. The habitat was originally given as Mexico, but Hellmayr (Bds. Amer., IV, p. 322) who has examined the type, says that it is of Bogotá make. This East Andean city may well be fixed as the type locality for typical *lacrymiger.*

In describing this new race it seems advisable to make it a subspecies of *lacrymiger,* though I must say I see little reason to keep *lacrymiger* distinct from *affinis* (1839), which is the species to which *lacrymiger* (1849) and all its forms should be attached.

Stone's record (Proc. Acad. Nat. Sci., LXXXIV, p. 318, 1932) of *Lepidocolaptes souleyetii insignis* (Nelson) from San Juancito, Honduras, is referable to *Lepidocolaptes affinis* subspecies, a species not recorded from Honduras by Hellmayr.

Campylorhamphus pusillus pusillus (Sclater)

Birds from the Pacific slope of Colombia tend to be darker than birds from more eastern localities, and to have the back and under parts less heavily streaked. A pair from the Rio Munchique (3000 ft.) are very dark as are two others from Barbacoas and Jimenez. However, another from Cocal is as pale as examples typical of *pusillus.*

Western birds can be regarded as dark extremes of *pusillus.* I have examined the type of *C. chapmani* Ridgway in the American Museum of Natural History, and it is a light colored and heavily streaked extreme of *pusillus.*

Sittasomus griseicapillus amazonus Lafresnaye

A single male was secured at La Morelia.

This widespread species must be rare in Colombia for other than "Bogotá," records, the only specimen previously recorded was one from the Rio Uaupés, opposite Tahuapunto.

Dendrocincla fuliginosa phaeochroa Berlepsch and Hartert

A male taken at La Morelia. Previously this bird was known in Colombia from the Meta, and "Bogotá." From the northern end of the Eastern Andes we have specimens from Palmár, Boyacá.

NOTULAE NATURAE

NUMBER 154 OF MAY 23, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW SMALL REPTILE FROM THE TRIASSIC OF PENNSYLVANIA

BY WILHELM BOCK

Department of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia

The Lockatong formation of the Upper Triassic, Newark series, is extensively exposed in Montgomery County, Pennsylvania, in numerous railroad cuts and quarries, many of which exposures have been thoroughly studied and have yielded important fossils. In Gwynedd Township alone, in the vicinity of the small town of North Wales, numerous fish and reptile bones, mollusks, crustaceans, tracks and a remarkable flora have been discovered. Most of these fossils were found in the debris of a railroad cut on the Reading Railroad at Gwynedd, between North Wales and Gwynedd Valley, where the rocks removed from a tunnel are spread over an area of 15 acres and are easily accessible. The top of the surrounding formation is a clay mixed with shale fragments, and the beds through which the tunnel is cut, are more compact layers of reddish shale. These layers are interbedded with several narrow bands of thinner bedded dark shale and some heavier bands of lighter shale with a conchoidal fracture. The thinner bedded shale was doubtless deposited in standing or slowly moving water.

Only the dark bands of the formation are rich in remains of animals, especially many kinds of fish, of which six different species have been recognized so far, including the rare *Diplurus longicaudatus*. Some plant remains were found in these thinner bedded shales, but most of the plant fossils are contained in the dark shale which breaks with a conchoidal fracture. The area probably was originally a swamp. Tree trunks with branches from 4 to 5 feet long and many stems of what are probably neocalamites, have been found. Branches of *Volzia*, *Brachiphyllum* and other conifers including many seeds, were secured, while leaves of *Podozamites* were also collected. Most abundant, however, are different species of algae of the family Dasycladaceae, which invest large blocks and cover many layers of the dark and also the reddish shales.

The heavy bedded gray shale, which is hard and will rarely split, contains scarcely any fossils, though a few small bones and teeth have been found in it. As these shales were probably deposited by flood waters, the scarcity of fossils in them is not surprising. The surface of these heavy layers often bears mud-cracks and ripple marks. The tracks of a large dinosaur, of small reptiles and minute tracks of invertebrates are also numerous in these beds.

Descriptions of most of the fossils that have been discovered in this Gwynedd deposit will be published at a later date. The purpose of this paper is to describe the skeletal remains of a tiny reptile (approximately 18 cms. in length) which was found by the four year old son of the author, in one of the thin bedded layers of dark shale deposited on the ground. This layer contained numerous fish bones and a complete skeleton of the ganoid *Catopterus redfieldi.*

As shown in figure 1, the bones of this reptile are scattered through the rather soft shale, in which they are embedded. They are highly carbonized and must have been light and fragile. The cartilaginous portions of the skeleton are wanting and the articular extremities of the limb bones are therefore not preserved. There are approximately seventy bones present. Although the position of some of the bones in the skeleton is difficult to determine, others, such as those of the shoulder girdle and the vertebral column, are in excellent condition and are easily recognized. There is no doubt that the animal was buried under water, since the shale in which it is embedded also contains bones of a ganoid fish. The most important bones shown in figure 1 are numbered and referred to in the description, which is presented below.

SAURISCHIA (?)

THEROPODA (?)

PODOKESAURIDAE (?)

GWYNEDDOSAURUS new genus

Resembles in many features *Podokesaurus* Talbot[1] 1911, but differs in two essential elements. The neural spine of each vertebra has a boat-like outline with a straight dorsal margin and each vertebra has a ball and socket articulation, characters not found in the vertebrae of *Podokesaurus.* The elements of the shoulder girdle are different in shape from those found in *Podokesaurus* and are also differently attached to one another.

---

[1] Talbot, M., Amer. Jour. Sci., (4) XXXI, pp. 469-479, 1911 A restoration of *Podokesaurus* is figured by Lull, R. S, Conn. State Geol. and Nat. Hist. Survey, Bull. 24, pl. V, 1915.

Gwyneddosaurus erici new species Figures 1-2.

Type.—Skeletal remains, Bock Collection, Academy of Natural Sciences of Philadelphia, type no. 15072.

Locality.—Gwynedd, Montgomery County, Pennsylvania.

Horizon.—Upper Triassic, Lockatong Formation.

Description.—The shoulder girdle is represented by two parts which apparently are the coracoid and the scapula (17, 18). The bone here interpreted as the coracoid is a conical, rather flat body, the smaller end being connected with the concavely-curved part of the scapula, while the larger rounded end may represent the sternal connection. The upper side is slightly convex, is heavier along the middle line than along the sides and has a slight expansion at both sides, where it joins the scapula. The coracoid is subdivided into nine segments, the largest located at the sternal side. This division seemed at first of ornamental design, but as one of the coracoids accidently broke off, it separated into nine little sections, suggesting that these segments were probably connected by cartilage. The probability exists that this bone may be a pre-coracoid.

The bone which appears to the author to be the scapula forms a more or less semicircular plate having the appearance of a heart-shaped leaf. In spite of its rather irregular shape, there can be distinguished four sides. The deep concave side, which contacts the coracoid, forms two sharp, overhanging corners. The upper side, which is almost straight, is distinguished from the others by an overlapping narrow edge. The border of the left side is free, while the right side shows two elliptical sockets, one of which may represent the glenoid cavity. The surface of this slightly convex plate is rather smooth, showing some faint radial striation and several concentric lines along the upper edge. It should be mentioned that the articulating surfaces of the glenoid of this specimen are not shared as usual by the supposed coracoid and scapula, but are used only by the latter.

The bones of the fore limb (21, 22) have been preserved apparently in their natural position, but without any physical connection. While some of them are not well preserved, they disclose interesting characteristics. The shafts of the radius-ulna seem to be compound. No other separate bone which could take the place of a detached ulna is noticeable. Small hand bones are present, one of them having a finger-like bone attached (21). The humerus of the right side as well as the left is preserved only as an incomplete piece. The shaft is well curved and broader at the anterior than at the posterior extremity. It is characterized by a heavy ridge prominently exposed at the anterior end, then flattening out toward the other extremity. The length of the radius-ulna is 4 millimeters, and that of the humerus approximately 7 millimeters.

Bones of the hand and wrist are apparently present, but are not easily distinguishable. They are small, mostly fragments, grouped close to the fore limbs (40-42 in fig. 1). The length of the largest finger is 10 millimeters and it has a pronounced claw-like end.

The bones of the hinder extremity are partially preserved, but few have distinctive characteristics. The best formed one is probably a tarsal bone (25) and a less well preserved similar bone (27). Each of these is 12 millimeters long and consists mainly of a shaft, rather narrow in the middle (0 6 millimeter) and expanding considerably at the extremities; one of them exhibits the clear outline of an elliptically-curved articular head. Number 31 seems to represent another foot bone. Right above these appears the largest bone (1) of the skeleton. It is 23 millimeters long, having on one end a straight edge (4 millimeters) without an articulation, while at the other extremity a round smooth head of rather small dimensions (2 millimeters) is visible. The bone is of conical shape with a slight convex curve on one side. The surface of the shaft is striated, especially at the narrow end. The general appearance suggests a femur or tibia. There are also a number of other foot bones (32-38) which probably are toes. They are blunt on one end and sharply pointed at the other. Most of them are freely distributed at the lower end of the specimen, but are nowhere arranged in an osteologic sequence. One of the bones (34) is bent, suggesting the weak point of a joint. The length of the toes varies from 8 to 13 millimeters.

Ribs (26, 28-30, 44-51) are numerous. While some are fragmentary, others such as 45 and 46 are well preserved. The shaft, which is grooved and rather curved, has on one end a single conical head, while the other extremity appears slightly club-shaped. There are three other rib-like bones, (23, 24, 43), which curve in different proportions. They are stronger than the remaining ribs and terminate in a two-headed extremity. Bone 23 has also a small curved plate attached, which suggests that these two pieces represent the ischia. There are a number of bifurcated small bones present (39) which seem to be cervical ribs.

The ilia may be indicated by two thin longitudinal plates of trapezoidal shape (19, 20). The surfaces are rather smooth and do not disclose any traces suggesting the acetabulum or connections with other pelvic bones.

The vertebrae are the best preserved bones of the skeleton. The dorsal and cervical vertebrae are easily distinguishable, but there are no traces of caudal vertebrae. Altogether, there seem to be 13 to 14 vertebrae present. The two dorsal vertebrae (3 and 4) are well preserved with their sides exposed. Both are almost identical in appearance and dimensions. The neural spine is clearly visible and resembles a boat with a straight upper side. The centrum has the general outline of a horn, with the pointed end directed posteriorly downwards, forming a well-shaped oval ball articulation. The neural spine has a depression in the center and seems to rest on the declining part of the top of the centrum in a somewhat posterior position. At the anterior side, the centrum shows two facets, the upper slightly smaller than the lower. The latter represents the articulating socket exactly fitting in the preceding ball articulation. This is a very important feature since it places this type of vertebrae in the procoelous class not observed in reptiles until the Jurassic period. The outer surface, especially the lower part, is ornamented with a longitudinal cell-texture design (figure

2). The remaining vertebrae (4, 5 and 9-12) do not add any further details, as they are mostly fragmentary. There is a cross-section present, which shows the ball articulation from the back (8) and a good sized rib (46), apparently in its natural position. Over this rib appears a process (51), which may be a rib of another vertebra. Number 11 is a cross-section of a smaller vertebra with two zygapophyses at each side. The neural spine is wanting. Vertebrae 6 and 7 are recognized as cervical ones and are distinguished from the dorsal by their greater length and diminished width. Number 14 is probably the atlas or a head bone.

The skull bones (13 and 15) are somewhat crushed and distorted and their characters cannot be determined with certainty. Bone 16 apparently represents a pterygoid. No other head bones were found.

Discussion.—Owing to the large number of bones, some of which are in fairly good condition, it would have been expected that the identification of the fossil would not offer great difficulties. However, because of the absence of the skull or clearly recognizable head bones, and because of the presence of some unusual features not recognized in any other fossil, a final conclusion is not possible at the present time. There are five outstanding groups of elements in this skeleton,—the shoulder girdle, bones of the fore limbs, the hind legs, the ribs and the vertebrae. The latter amount to about fourteen, are of light construction with well-developed rather modern characteristics and are reptilian in appearance. Tail bones are entirely absent. The supposed scapula and coracoid with their distinct and unusual shape, have not helped so far to solve the problem of relationship. The assignment of the coracoid is made doubtful by the fact that it does not take part in the articulation of the humerus. It might be a pre-coracoid as shown in *Cryptobranchus*. As there are two articulating cavities recognizable, it is quite possible that the one represents the attachment of the real coracoid and the other provides articulation with the humerus. However, there also is a probability that the bone described as the scapula may be the coracoid, as there are no sternal connections or other identifying characters. The ribs are numerous and amount to about 16, most of them fragmentary. The complete ones are well curved, reptilian in appearance and disclose a rather oval cross-section of the body. The well preserved dorsal vertebrae are significant, but their outstanding character, since they are seemingly of the procoelous type with a distinct socket and ball articulation, unknown so far during the Triassic period, defies comparison with known material. Their well-advanced structure could be compared with vertebrae found in the order Lacertilia, but other bones are quite different from corresponding ones in reptiles of this order.

The fore and hind limbs seem to shed some light on the habits of the specimen. While the radius ulna apparently is present only as a compound element, though not well preserved, the relationship in length of the fore and hind legs permits us to make a comparison with contemporaneous creatures of this size. The linear proportions between the front and hind legs, which is about one to four, discloses that the animal probably preferred the bipedal gait. The light construction of the vertebrae and other bones, some of them appearing to be hollow, seems to picture it as a swift-moving little reptile. It has been suggested that the resemblance as a whole is that of a Saurischian of the suborder Theropoda. Von Huene[2] has described in his memoir on the Saurischia a small reptile under the name of *Procompsognathus triassicus*, which in outline and dimensional relationship, especially of the front and hind legs, approaches closest to our specimen. However, the latter is only a third as large as *Procompsognathus*, and the suggestion that it may be a young specimen is doubtful because of the well-developed construction and thorough ossification of all the bones. Talbot[1] described the genus *Podokesaurus*, which is similar in appearance to *Gwyneddosaurus* and somewhat smaller than the European genus. The relationship of fore and hind limbs in our fossil is also close to that of *Podokesaurus*, but there is not sufficient evidence to include the former in the same family as *Podokesaurus*. Although, there are small Pseudosuchians of this size recorded in the Triassic, the absence of the pronounced differentiation of front and hind legs and the dissimilarity of the vertebrae, seem to discourage further comparison with this suborder.

While the evidence may justify the assignment of the specimen to the order Coelurosauria, other pronounced characteristics, especially of the shoulder girdle and the distinct and procoelous structure of the vertebrae and the absence of the skull, do not permit us to consider the identification conclusive. Further disclosures, as the writer's discovery in the meantime of several leg bones, similar to those of our specimen and a number of small tracks in the same horizon, might reveal more about the origin and habits of the creature. If it is a reptile, it is doubtless the smallest one so far found in the Triassic of the United States and certainly encourages further search for similar material.

The writer is indebted for advice, suggestions and preparation of the fossil to Dr. B. F. Howell, Dr. Edwin H. Colbert, Dr. Glenn L. Jepsen, Dr. A. S. Romer and Dr. Horace G. Richards.

---

[2] Von Huene, F. Die fossile Reptil-Ordnung Saurischia, pt. I, pp 24-32, 1932.

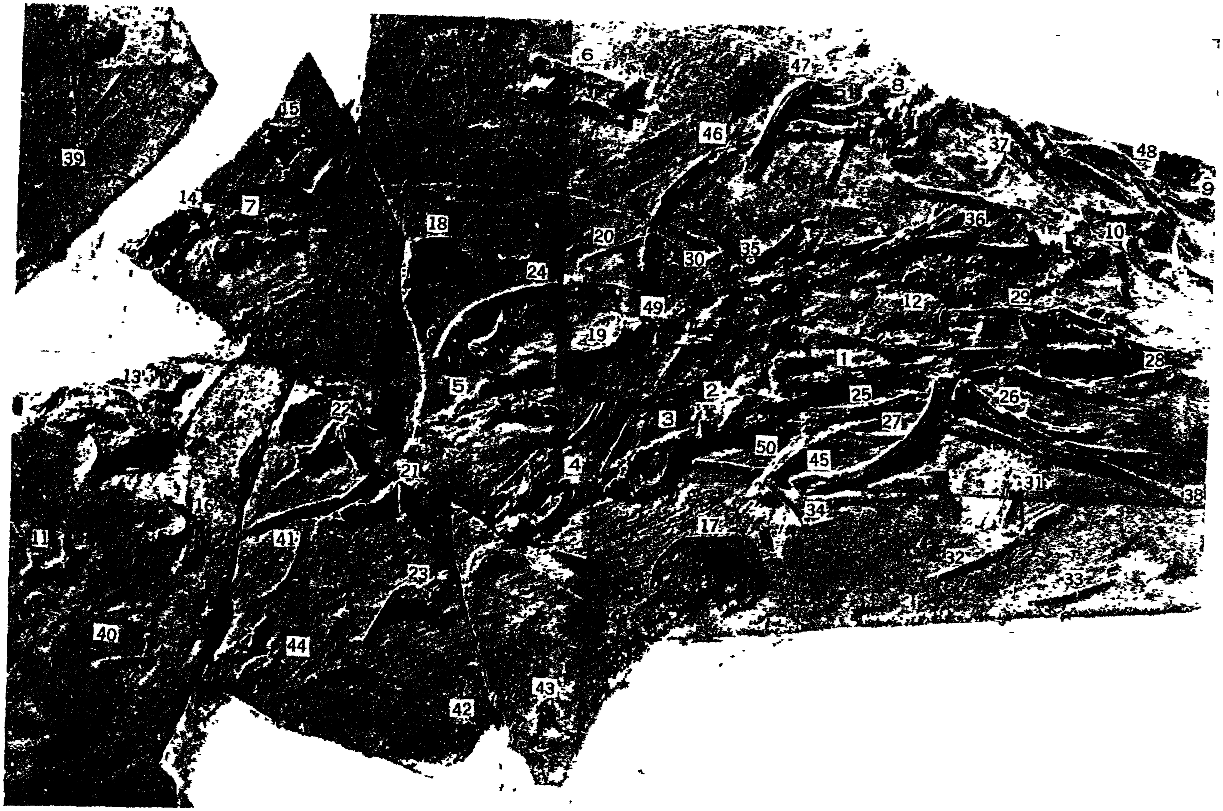


Figure 1.—*Gwyneddosaurus erici* new genus and species (× 2). Bones as preserved in the matrix after final preparation

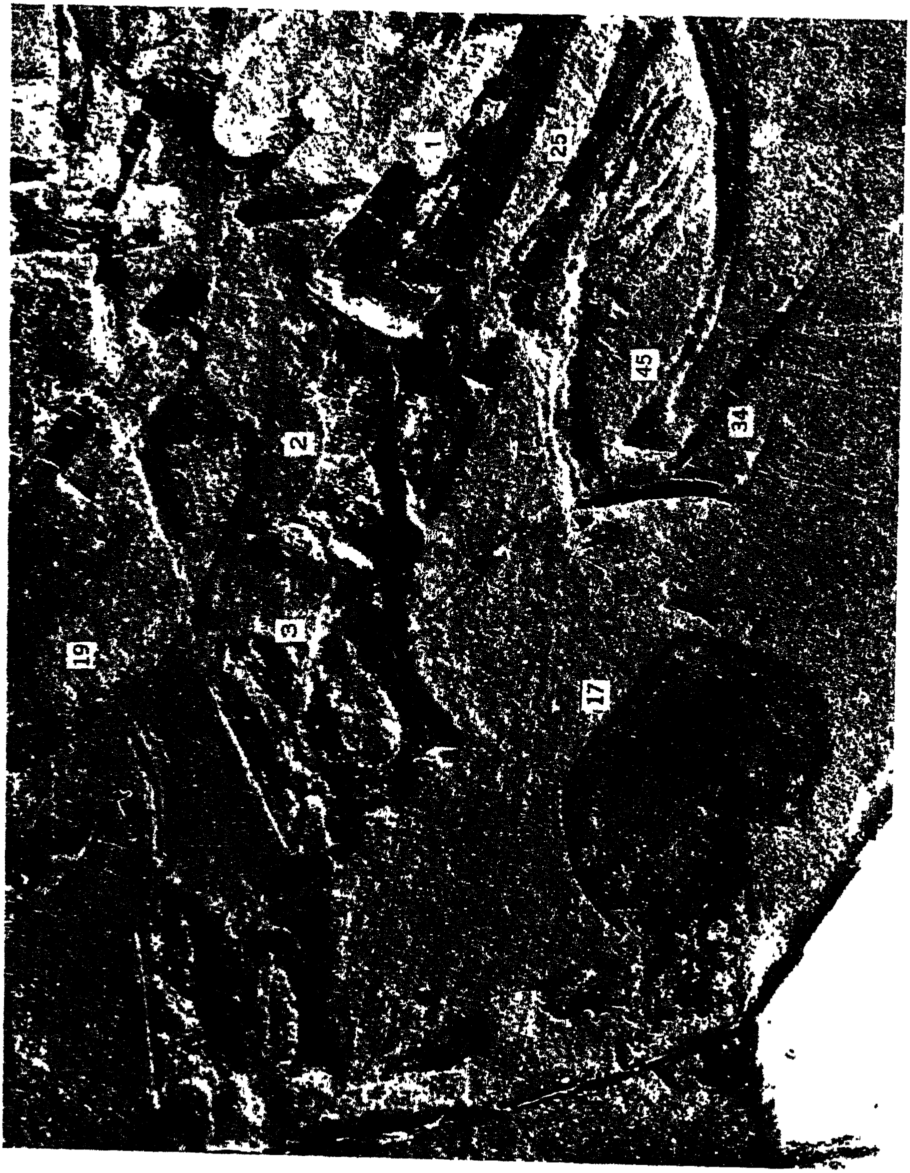


Figure 2.—*Gwyneddosaurus erici* new genus and species (× 8) View of vertebrae, shoulder girdle, leg bones and toes.

NOTULAE NATURAE

NUMBER 155 OF JULY 13, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW GENUS AND SPECIES OF LOCUST OF THE GROUP EUTHYMIAE (ORTHOPTERA, ACRIDIDAE, CYRTACANTHACRIDINAE) FROM SOUTH AFRICA

BY JAMES A. G. REHN

Curator of Insects, Academy of Natural Sciences of Philadelphia

The accumulation at the Academy of Natural Sciences of an unequalled representation of Old World members of the locust group Euthymiae, made it possible for me to present last year a review of the forms of that assemblage then known to occur in the Eastern Hemisphere.[1] Several very striking new genera from Cape Province, Union of South Africa, were then described, almost entirely from material there collected by my colleague Dr. E. R. Helwig. By inadvertence an additional single specimen of the group, also collected by him, was overlooked, and this, located too late for inclusion in the larger paper, is here described. It represents another most striking and distinctive new genus and species of rather anomalous character.

The Academy is deeply indebted to Dr. Helwig not only for this novelty, and those from the same collection already described or reported, but also for the gift of the remainder of this quite comprehensive series of South African members of the Orthoptera, which contains many other striking or little-known forms.

KARRUIA[2] new genus

More nearly related to *Helwigacris* Rehn[3] than to any other known genus of the Euthymiae, but differing in a number of important features. The fastigium is produced in a submitriform fashion which recalls the

---

[1] "A Review of the Old World Euthymiae (Orthoptera, Acrididae, Cyrtacanthacridinae)." Proc. Acad. Nat. Sci. Phila., XCVI, pp 1-135, pls. 1-8, (1944).

[2] From the Great Karroo, where the genotypic species occurs.

[3] Proc. Acad. Nat Sci. Phila., XCVI, pp. 22, 98, (1944). Genotype.—*H. insolita* Rehn, from Knysna, Cape Province, Union of South Africa.

African *Pristocorypha*, and the general rugosity of the body also suggests that genus, but *Karruia* is entirely apterous, has the prosternal process as in *Helwigacris* and the antennal development more nearly approaches that found in the last mentioned genus than it does the elongate subfiliform type of *Pristocorypha*,[4] or in fact that of any other euthymiid.

The genus *Karruia* is separable from all other genera of the group by its combination of very short, depressed and expanded antennae, submitriform fastigium, apterous condition, rugose to rugulose dorsal surface, broad and depressed prosternal structure, typical euthymioid limbs and normal type of ovipositor valves. There exists a possibility the unique type of the single known species may be in the instar preceding maturity, but there is no certain evidence of this.

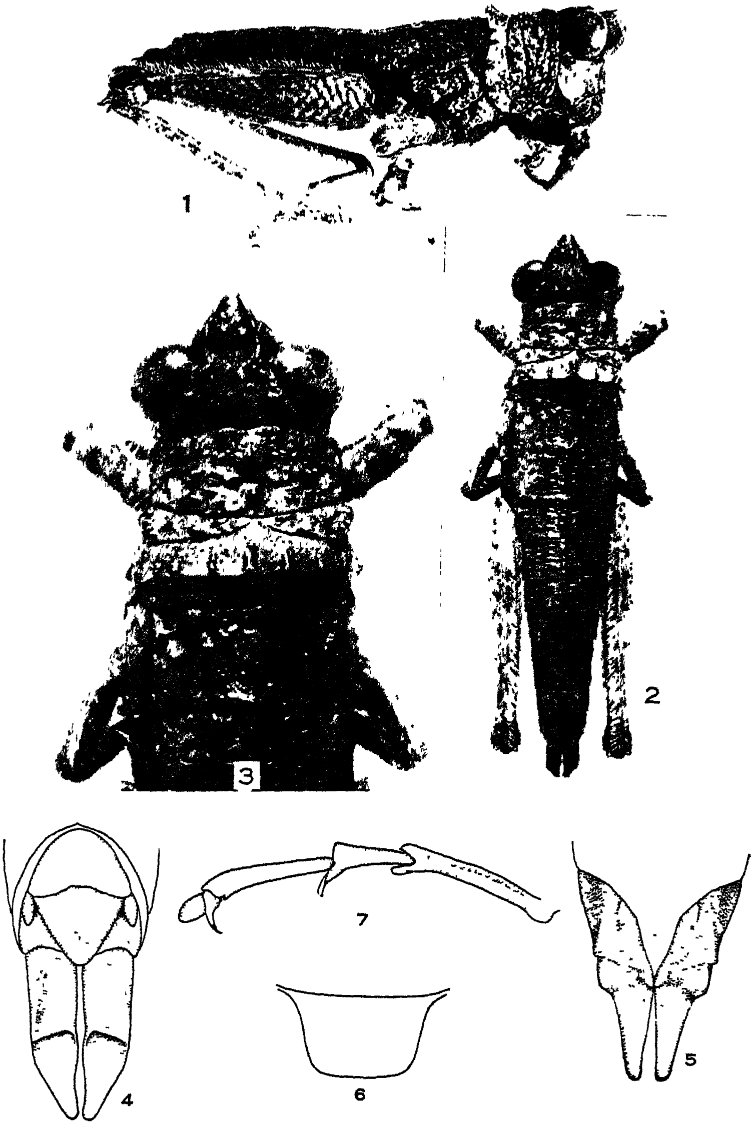
Generic features.—Female sex alone known. Form subrhicnodermoid, apterous. Dorsal surface rugulose to rugose, rugae along cephalic and caudal margins of pronotum short, linear and plicate, body subdepressed, thoracic venter subconcave, moderately polished.

Head broad, interocular space slightly narrower than transverse width of single eye (♀); fastigium conically submitriform produced as seen from dorsum, slightly shorter than exposed occiput, apex acute, dorsal surface transversely impressed at fastigial base, dorso-lateral margins carinulate, these terminating caudad at the cephalic of two pairs of occipital juxta-ocular tubercles, no median carina indicated on occiput or fastigium, in profile fastigium is moderately rostrate, with cephalic outline subtruncate, the ventro-rostral outline thence retreating to lower face which is subvertical; frontal costa with dorsal fourth not sulcate, consisting of a single carina, which forks briefly dorsad of the antennal bases, ventrad of this point shallowly sulcate with the bordering margins definitely carinate; lateral (supplementary) facial carinae distinct; eyes prominent, ovate in basal outline as seen in profile; antennae, distad of the two proximal articles, very short, less than half as long as depth of head, strongly depressed sublamellate, in outline lanceolate, its greatest breadth (at fourth article) equal to two-fifths of length of articles distad of second, apex subacute.

Pronotum moderately sellate as seen in profile, broader than long, its greatest median length equal to but seven-elevenths of the greatest caudal breadth across lateral lobes; cephalic and caudal margins of disk each shallowly emarginate mesad; median carina represented by two spaced nodes on the prozona and a distinct cariniform elevation on the metazona, two transverse sulci completely intersecting the median carinal section, dorsum rounding into lateral lobes without demarkation; lateral lobes in outline broadly arcuate ventro-caudad, there broader than dorsad. Mesonotum, metanotum and abdominal dorsum with a low median and several pairs of

---

[4] For a study of this genus see Rehn, Proc. Acad. Nat. Sci., Phila., XCI, pp. 291-309, (1940).



Karruia paradoxa new genus and species Female (*type*). Seven Weeks Poort. Cape Province, Union of South Africa. Fig. 1—Lateral view (X 3.75) Fig. 2.—Dorsal view) X 3.75). Fig. 3.—Dorsal view of head and thoracic segments (X 7.7). Fig. 4—Dorsal view of apex of abdomen. Fig 5.—Ventral view of apex of abdomen. Fig. 6—Outline of prosternal process. Fig. 7—Caudal tarsus. (Figs. 4 to 7 greatly enlarged.)

accompanying lateral subparallel strumosely subcarinate rugulae, longitudinally disposed, each made up of a series of low welt-like nodules, the lateral series usually subarcuate on each individual tergite, the whole becoming progressively less evident distad: supra-anal plate broad proximad, median transverse impression marked, distal section with moderately acute converging margins, apex rounded; ovipositor valves of normal acridid type, less attenuate than in *Helwigacris*, distal concavities evident, apices moderately recurved, dorsal valves with more deplanate proximal portion of dorsal surface definitely cut off from distal concavity by a transverse carinula, ventro-lateral margin of ventral valves with a distinct angulate shoulder: subgenital plate deplanate, with distal margin acutely produced mesad.

Prosternal process deplanate, transverse, broader cephalad than caudad, lateral outlines of same regularly converging caudad. Mesosternum damaged in unique type; metasternal lobes separated by an interspace equal to one-fourth of the total breadth across the metasternum, metasternal foveolae large, caudad obliquely converging and but narrowly separated mesad.

Cephalic and median limbs short and stout, typically euthymioid in the thick depressed form of the cephalic femora and tibiae and the deeper, more compressed character of the median femora and tibiae, neither femur exceeding the pronotum in length. Caudal femora subcompressed, moderately robust in profile, paginal pattern regular, latter and bounding carinae in part with numerous pustuliform nodes; caudal tibiae with external extensor spines seven in number, including apical one, internal extensor margin with ten to eleven spines, also including the apical one; caudal tarsi slender, slightly less than half as long as caudal tibiae, proximal and distal articles subequal in length, each much longer than second article; tarsal claws subequal in length, arolium large, subtrigonal as seen from dorsum. Limbs, and in particular the dorsal surfaces of the caudal femora and tibiae, well supplied with long whitish hairs, abdomen without usual ventro-lateral series of same.

Genotype.—*K. paradoxa* new species.

Distribution.—Known only from the Great Karroo of Cape Province, union of South Africa.

Karruia paradoxa [5] new species Figs. 1 to 7.

Type.—♀; Seven Weeks Poort, Cape Province,[6] Union of South Africa. March 20, 1939. (E. R. Helwig.) [Academy of Natural Sciences of Philadelphia, Type no. 5702.]

---

[5] In allusion to the unusual and rather contradictory character of some of its features.

[6] This locality is at the southwestern corner of the Great Karroo, at the north foot of the Klein Zwartbergen. Its position is roughly 21°25′ E., 33°20′ S., and the elevation is approximately 4000 feet.

Size small (for the group).

Head with normally exposed dorsal length (to extremity of fastigium) slightly less than the median length of the pronotal dorsum, greatest breadth of head across eyes one and three-fifths times greatest dorsal length of same; occiput moderately arcuate longitudinally, with two paired groups of nodose tubercles placed close to the ocular margins, the cephalic pair slightly caudad of the least interocular width, the more caudal pair almost equidistant between the cephalic pair and the base of the occiput; fastigium as seen from dorsum with greatest basal width but slightly greater than median length cephalad of the pronounced transverse basal impression, lateral margins, as seen in same view, sinuately converging to the moderately acute apex, these margins cariniform, continuing caudad to the cephalic pair of occipital tubercles, surface of dorsum of fastigium with a few low boss-like tubercles, no median carinula present, in profile the dorso-lateral margins of the fastigium are seen to be moderately arcuate, decurving ventro-cephalad to the vertically truncate extremity of the rostrum; lateral foveolae evident only as small sublanceolate impressions, extending half as far cephalad as the fastigial disk and separated from the latter by the lateral margins of the fastigium and ventrad delimited by a similar carina; surface of sides of fastigium immediately cephalad of the lateral foveolae with several groups of small, linearly arranged tubercles; frontal costa with breadth of dorsal half of sulcate portion subequal, that from briefly ventrad of median ocellus moderately widening toward clypeus; supplementary (lateral) facial carinae slightly diverging ventrad; surface of face ruguloso-tuberculose, of genae largely lacking tubercles but with a pronounced oblique impression extending ventro-cephalad. Antennae described under genus.[7] Eyes markedly prominent, with breadth across them subequal to greatest depth of head as seen in cephalic aspect, basal eye outline ovate, the longest axis slightly oblique in relation to head depth and equal to four-fifths of greatest depth of infra-ocular portion of genae.

Pronotum moderately narrowing cephalad as seen from dorsum, cephalic and caudal margins of disk roughly subtruncate in their entireties, the former weakly arcuate on each side of a weak median emargination; surface of pronotum with the longitudinally disposed spaced rugae along the cephalic and caudal margins relatively marked, numbering six to seven on each side, with those more ventrad simple tubercles instead of true rugae, in addition to numerous low strumose tubercles distributed over the surface a marked subacute tubercle is present on each side between the second and third transverse sulci, in the usual position of lateral carinae, and others lower and smaller but quite marked are distributed between the second and third carinae on the disk; transverse sulci laterad three in number, markedly impressed, the second and third joining dorsad at the median line, metanotum at same point equal to one-third of total pronotal length, laterad by the curve of the principal sulcus it passes to not more than one-fourth of the same length: lateral lobes slightly deeper (from mid-dorsal line) than greatest length, cephalic margin nearly vertical, faintly sinuate, ventro-cephalic angle obtuse, ventral margin oblique cephalad, broadly rounding caudad and thence dorsad to the concave dorsal portion of the caudal margin of the lobes, surface ventrad subplicately multistrumose.

---

[7] Unfortunately between the time the description was written and the illustrations prepared the antennae were detached and lost, so their characteristics could not be illustrated, and they are lacking in the figures.

Mesonotum with caudal margin projecting but narrowly caudad of the pronotum, margin very shallowly concave. Metanotum with caudal margin, like those of the majority of the abdominal tergites, truncate, the metanotal margin arcuate laterad; sculpture described under genus. Antepenultimate abdominal tergite with its distal margin markedly V-emarginate, that of the penultimate tergite similar but less markedly, ultimate tergite with distal margin acutely emarginate, revealing the broad base of the supra-anal plate, caudo-lateral angles of ultimate tergite moderately acute. Supra-anal plate as a whole slightly longer than broad, transverse impression marked and nearly straight, surface of proximal portion of plate slightly ascending to base, of distal half deplanate with extreme apex narrowly decurved; cerci very short, stout, conical, not longer than one-third of distal half of supra-anal plate; ovipositor valves described under genus, lateral plates of ventral valves sublanceolate, subacute distad; subgenital plate with the definitely deplanate ventral surface rounding dorsad into the vertical lateral sections, median acute production of distal margin very pronounced, reaching caudad as far as the apices of the lateral plates of the ventral ovipositor valves.

Cephalic femora slightly shorter than the medio-dorsal pronotal length, dorsal surface transversely arcuate but with a short substrumose cariniform longitudinal ridge nearer the cephalic face of the limb, ventral surface quite markedly deplanate, both genicular lobes rounded, that of the cephalic face larger and more prominent; cephalic tibiae somewhat shorter than the corresponding femora, appreciably depressed, definitely deplanate ventrad, ventro-cephalic margin, which is well-rounded, with a single adpressed spine mesad. Median femora equal in length to the cephalic femora, and like the latter of characteristic euthymioid type for the median limbs, i. e., compressed, deepening distad with cephalic genicular lobe expanded, produced and broadly arcuate, caudal genicular lobe rounded but not produced or expanded, dorsal surface with a medio-longitudinal substrumose carina and external (cephalic) face with a substrumose carina for most of its length near the ventral border; median tibiae very slightly longer than the femora. Caudal femora slightly surpassing the base of the ovipositor valves, greatest depth contained four and one-half times in the femoral length (as 12 to 54), least depth at narrowest pregenicular point slightly less than half of greatest depth (as 2.5 to 5.5), which latter is at proximal fourth, proximal supra-articular portion of dorsal margin with the characteristic outcurve found in numerous genera of the Euthymiae, genicular lobes bluntly acute, mid-dorsal carina with six or so spaced nodules, nodose tubercles of lateral (external) carinae well spaced, eight or so in number, becoming less evident distad, those scattered over the more proximal chevrons of the external pagina more than twenty in number, those distad few and subobsolete;[8] caudal tibiae slightly bowed, as usual in the group subcompressed proximad, passing to subdepressed distad, external extensor spines slightly longer than internal ones, internal spurs unequal, that on the extensor side not more than two-thirds as long as the flexor one, and somewhat more strongly falcate than the latter.

Coloration.—Base color buckthorn brown, paling on the genae and caudal femora to clay color, most of the tubercles, rugae and similar structural elevations touched to a greater or lesser degree with prout's brown to mummy brown, most marked on the pronotal rugae and the paginal tubercles of the caudal femora; face mesad with a transvese cloud bar of mummy brown and dorsad of this indications of a similar but less evident and narrower one; eyes brussels brown; caudal femora with weak indications of one or more transverse clouds of blackish brown; caudal tibiae and tarsi (the latter paling distad) scarlet, weakly washed with pale purplish distad on the external extensor margin, the external face proximad weakly washed or clouded with the same.

Measurements (in millimeters).—Length of body, 19; length of pronotum, 2.4; length of caudal femur, 8.6.

The type of this species is unique.

It would seem from our increasing knowledge of the diversity of the South African members of the Euthymiae that austral Africa has been one, and probably the most active, of the evolutionary centers of the group. Those genera which, as far as we know at this time, are entirely restricted to southern Africa have no known related counterparts in other continents. By contrast certain more broadly distributed African euthymiid genera, such as *Hemiacris* and *Phalinus*, have a not far distant relative (*Clonacris*) in southern India and Ceylon.

---

[8] These tubercles recall those found in the same position in the South African euthymiid *Koranacris pumicea* Rehn (vide Proc. Acad. Nat. Sci Phila., XCVI, pp 107-110, (1944).

NOTULAE NATURAE

NUMBER 156 OF AUGUST 1, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON BUTEO MAGNIROSTRIS, WITH A DESCRIPTION OF A NEW FORM FROM PERU

BY RODOLPHE MEYER DE SCHAUENSEE

Curator of Birds, The Academy of Natural Sciences of Philadelphia

The identification of our Colombian material of this common hawk has led to the examination of almost 200 specimens from various parts of its range.

This study has shown that Colombia is inhabited by three forms, and, surprisingly enough, a very distinct undescribed form occurs in extreme southeastern Peru.

Buteo magnirostris magnirostris (Gmelin)

This form is found in Colombia, from Santander del Sur, southward to the Caquetá, and the head of the Magdalena Valley.

I can see no character by which *zamorae* Chapman can be distinguished from the nominate form.

Buteo m. magnirostris occurs from Guiana south to Pará (Belém), where it appears to intergrade with *nattereri*, and up the Amazon at least to Santarem.

A single bird from the mouth of the Curaray belongs to this form.

Buteo magnirostris insidiatrix (Bangs and Penard)

Bangs' Large-billed Hawk is a pale form of *magnirostris*. The back is of a purer, paler gray, the bands on the lower surface are paler and grayer, and the bands in the tail are paler, purer gray.

It appears to be a coastal form, confined to the Caribbean littoral from the Paría Peninsula and the mouths of the Orinoco extending westward to the Pacific coast of Colombia, thence turning southward down the Chocó, to the headwaters of the Atrato, and the Rio Baudó. Specimens from the latter locality are intermediate between this form and *ecuadoriensis* as shown by traces of rufous in the tail.

Birds from Permé and the Rio Chubaquy, Darien, are not at all typical of *insidiatrix* but are exactly intermediate between that form and *petulans* van Rossem (*ruficauda* auct.) in having the tail strongly tinged with rufous.

A male from Garachiné is typical of *petulans*.

Birds from the mouth of the Orinoco are intermediate between this form and *magnirostris*, but nearer the former.

Buteo magnirostris ecuadoriensis (Swann)

Birds from west Ecuador (Esmeraldas, Bucay) agree with a specimen from Ricaurte, and differ from *magnirostris* in being purer gray above and on the chest, and by having the tail slightly marked with rufous. *Insidiatrix* is still purer gray above, and has no rufous in the tail at all.

Cauca Valley birds are closest to *ecuadoriensis* and should go by that name. They differ slightly from Ecuador birds in having more rufous in the tail, and by often having a distinct rufous wash on the chest, and darker backs. To separate them on these characters, especially as they are average, would serve no purpose. They show the influence of *magnirostris* in the average darker back, and of *petulans* in the redness of the tail.

Buteo magnirostris occiduus (Bangs)

Occurs throughout Peru with the exception of a small region just north of Lake Titicaca in the province of Carabaya. It differs from *ecuadoriensis* by having no rufous in the tail, by having the dorsal surface a trifle browner, and by having the chest strongly washed with rufous.

Dr. James L. Peters has been kind enough to compare a specimen from the Rio Jelashte and another from San Juan, Chanchamayo, with the type and a series of *occiduus* and informs me that they agree with that form.

Buteo magnirostris inca new subspecies

TYPE.—♂ ad., A. N. S. P., no. 104,010, collected at La Oroya, Inambari, Dept. Puno, southeastern Peru by M. A. Carriker Jr., on June 12, 1931.

Description.—Nearest to *Buteo magnirostris saturatus*, (Sclater and Salvin), but readily distinguishable from that form by having the tail bars gray instead of rufous, the dorsal surface grayer and darker, the bars on the lower surface much broader and brighter, and by smaller size.

From *Buteo magnirostris superciliaris* (Vieillot), *inca* differs by darker upper surface, pure gray instead of mixed gray and rufous tail bars, somewhat deeper ochraceous upper tail-coverts, more ochraceous ground color to the lower surface, brighter bands on lower surface and darker throat and neck.

Measurements of type.—Wing 232, tail 156, tarsus 62.5, culmen from anterior edge of nostrils 16.5 mm.

Range. — Known only from the southern portion of the Dept. of Puno south and west of the mountains from which the Rio Tambopata and tributaries rise.

Remarks. — It is surprising to find so well-marked a form so close geographically to the type locality of *occiduus*, yet showing virtually no intermediacy between the northern " gray " type of *magnirostris* and the southern " brown " type as exemplified by *saturatus*. North Bolivian specimens of *saturatus* approach *inca* only in having the bars on the lower surface broader than in southern examples.

Specimens examined and their measurements follow:

B. m. magnirostris, British Guiana: 2o, Mahaicony Creek; ♂, Quonza River; unspecified ♂, 2 o; ♂, Rupununi River. Dutch Guiana: o, vicinity of Paramaribo; ♂, Wanaweg, Para; ♂, o, Nelydorp; 2o, Demerara. French Guiana: 2 o, " Cayenne ". Brazil: ♂, o, Belém (Pará); ♂, Santarem. Venezuela: ♂, Merida. Colombia: 7 ♂, 3 ♀, La Morelia; 3 ♂, ♀, San Agustín; 3 ♀, Buenavista (Huila); 2 ♂, La Candela; 4 ♀, o, Moscopan; ♂, ♀, Ibagüe; ♀, Toché; o, Honda; 2 ♂, Virolin, Santander del Sur. Ecuador: ♀, mouth of the Rio Curaray.

B. m. insidiatrix, Venezuela: 2 ♀, Cariaquito; ♂, ♀, Pedernales; ♀, Turmero; ♂, ♀, Maracay; ♂, Parapara; ♂, ♀, San Julian. Colombia: ♂, Carraipia, La Goajira; ♂, Maicao; ♀, Rio Hacha; ♂, ♀, Don Diego; ♂, Fundacion; ♀, Trojas de Cataca; ♂, Punto Cayman; ♀, Puerto Sagoc, Magdalena; 2 ♀, Ayacucho, Magdalena; ♂, Codazzi, Magdalena; ♂, Guamalito, Santander del Norte; o, Aguado de Pablo, Atlantico; ♀, Turbo; ♀, Rio Jurubidá; ♂, ♀, Rio Baudó. Panama: 3 ♂, 3 ♀, Permé; o, Rio Chubaquy (intermediates).

B. m. petulans, Panama: ♂, Garachiné; ♀, Gatún; ♀, Canal Zone; o, unspecified. Costa Rica: ♀, Pigres; o, La Palma; o, unspecified.

B. m. alius, Pearl Islands: 5 ♂, ♀, San José Island.

B. m. argutus, Costa Rica and Nicaragua: a series.

B. m. ecuadoriensis, Colombia: o, Retiro; ♂, ♀, Laguneta; ♂, Salento; 3 ♂, ♀, El Tambo; 2 ♂, 3 ♀, o, Popayan; 3 ♂, 5 ♀, Munchique; ♀, Ricaurte. Ecuador: ♂, Esmeraldas; 2 ♂, ♀, Bucay.

B. m. occiduus, Peru: ♂, Rio Jalashte; ♂, Tamborapa; ♀, Iquitos; ♂, Idma; ♂, ♀, Rio Cumbreciato; ♂, ♀, San Juan, Chanchamayo.

B. m. inca, Peru: ♂, ♀, La Oroya; o, Inca Mine.

B. m. saturatus, Bolivia: ♀, Chatarona; ♀, Calabatea; ♀, Susi; ♂ Santa Ana; ♂, " Yungas "; ♀, Incachaca; ♀, Samaipata; ♀, Buenavista; ♂, Tomina; ♀, Rio Lipeo; ♂, Bermejo.

B. m. superciliaris, Brazil: 3 ♂, 2 ♀, Descalvados, Matto Grosso.

B. m. nattereri, Brazil: ♀, Victoria, S. Paolo; 2 ♂, Fazenda Transvaal, Rio Verde, Goyaz.

Measurements in millimeters

	Wing	*Average*	*Tail*	*Average*
magnirostris				
Guianas				
5 ♂	207-230	215.2	142-153	148
3 ♀	223-231	227.6	147-159	153.6
8 o	211-228	220.5	142-165	150.4
La Morelia				
8 ♂	212-227	221.8	136-156.5	146.3
3 ♀	211-220	214.1	142-153	146
Magdalena Valley				
7 ♂	215-225	219.5	147.5-158	152.7
10 ♀	222-247	231.9	150-168	159.4
insidiatrix				
11 ♂	202-225	216.2	134-160.5	149
13 ♀	200-232	230	139-165	150.4
ecuadoriensis				
14 ♂	215-237	224	145-168.5	155
10 ♀	220-238	228.2	148-166	158.9
occiduus				
5 ♂	210-223	216	141-152	147.5
2 ♀	215-230	222.5	146-166	156
inca				
♂	225		160	
♀	233		171	
o	238		171	
saturatus				
4 ♂	248-258	252	165-176.5	169.6
6 ♀	255-287	266.7	162-184	174.9
superciliaris				
3 ♂	216-227.5	220.1	144-155	148.3
♀	229		161	
o	210		254	

Acknowledgments. — I wish to express my appreciation to Dr. J. L. Peters of the Museum of Comparative Zoölogy for being so kind as to compare Peruvian specimens with the type and a series of *B. m. occiduus* and for lending me Guiana and Darien specimens.

Also I wish to thank Dr. Herbert Friedmann for his kindness in lending me a large amount of material from the collections of the United States National Museum.

NOTULAE NATURAE

NUMBER 156 OF AUGUST 1, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON BUTEO MAGNIROSTRIS, WITH A DESCRIPTION OF A NEW FORM FROM PERU

BY RODOLPHE MEYER DE SCHAUENSEE

Curator of Birds, The Academy of Natural Sciences of Philadelphia

The identification of our Colombian material of this common hawk has led to the examination of almost 200 specimens from various parts of its range.

This study has shown that Colombia is inhabited by three forms, and, surprisingly enough, a very distinct undescribed form occurs in extreme southeastern Peru.

Buteo magnirostris magnirostris (Gmelin)

This form is found in Colombia, from Santander del Sur, southward to the Caquetá, and the head of the Magdalena Valley.

I can see no character by which *zamorae* Chapman can be distinguished from the nominate form.

Buteo m. magnirostris occurs from Guiana south to Pará (Belém), where it appears to intergrade with *nattereri*, and up the Amazon at least to Santarem.

A single bird from the mouth of the Curaray belongs to this form.

Buteo magnirostris insidiatrix (Bangs and Penard)

Bangs' Large-billed Hawk is a pale form of *magnirostris*. The back is of a purer, paler gray, the bands on the lower surface are paler and grayer, and the bands in the tail are paler, purer gray.

It appears to be a coastal form, confined to the Caribbean littoral from the Paría Peninsula and the mouths of the Orinoco extending westward to the Pacific coast of Colombia, thence turning southward down the Chocó, to the headwaters of the Atrato, and the Rio Baudó. Specimens from the latter locality are intermediate between this form and *ecuadoriensis* as shown by traces of rufous in the tail.

Birds from Permé and the Rio Chubaquy, Darien, are not at all typical of *insidiatrix* but are exactly intermediate between that form and *petulans* van Rossem (*ruficauda* auct.) in having the tail strongly tinged with rufous.

A male from Garachiné is typical of *petulans*.

Birds from the mouth of the Orinoco are intermediate between this form and *magnirostris*, but nearer the former.

Buteo magnirostris ecuadoriensis (Swann)

Birds from west Ecuador (Esmeraldas, Bucay) agree with a specimen from Ricaurte, and differ from *magnirostris* in being purer gray above and on the chest, and by having the tail slightly marked with rufous. *Insidiatrix* is still purer gray above, and has no rufous in the tail at all.

Cauca Valley birds are closest to *ecuadoriensis* and should go by that name. They differ slightly from Ecuador birds in having more rufous in the tail, and by often having a distinct rufous wash on the chest, and darker backs. To separate them on these characters, especially as they are average, would serve no purpose. They show the influence of *magnirostris* in the average darker back, and of *petulans* in the redness of the tail.

Buteo magnirostris occiduus (Bangs)

Occurs throughout Peru with the exception of a small region just north of Lake Titicaca in the province of Carabaya. It differs from *ecuadoriensis* by having no rufous in the tail, by having the dorsal surface a trifle browner, and by having the chest strongly washed with rufous.

Dr. James L. Peters has been kind enough to compare a specimen from the Rio Jelashte and another from San Juan, Chanchamayo, with the type and a series of *occiduus* and informs me that they agree with that form.

Buteo magnirostris inca new subspecies

TYPE.— ♂ ad., A. N. S. P., no. 104,010, collected at La Oroya, Inambari, Dept. Puno, southeastern Peru by M. A. Carriker Jr., on June 12, 1931.

Description.—Nearest to *Buteo magnirostris saturatus*, (Sclater and Salvin), but readily distinguishable from that form by having the tail bars gray instead of rufous, the dorsal surface grayer and darker, the bars on the lower surface much broader and brighter, and by smaller size.

From *Buteo magnirostris superciliaris* (Vieillot), *inca* differs by darker upper surface, pure gray instead of mixed gray and rufous tail bars, somewhat deeper ochraceous upper tail-coverts, more ochraceous ground color to the lower surface, brighter bands on lower surface and darker throat and neck.

Measurements of type.—Wing 232, tail 156, tarsus 62.5, culmen from anterior edge of nostrils 16.5 mm.

Range.—Known only from the southern portion of the Dept. of Puno south and west of the mountains from which the Rio Tambopata and tributaries rise.

Remarks.—It is surprising to find so well-marked a form so close geographically to the type locality of *occiduus*, yet showing virtually no intermediacy between the northern " gray " type of *magnirostris* and the southern " brown " type as exemplified by *saturatus*. North Bolivian specimens of *saturatus* approach *inca* only in having the bars on the lower surface broader than in southern examples.

Specimens examined and their measurements follow:

B. m. magnirostris, British Guiana: 2o, Mahaicony Creek; ♂, Quonza River; unspecified ♂, 2 o; ♂, Rupununi River. Dutch Guiana: o, vicinity of Paramaribo; ♂, Wanaweg, Para; ♂, o, Nelydorp; 2o, Demerara. French Guiana: 2 o, " Cayenne ". Brazil: ♂, o, Belém (Pará); ♂, Santarem. Venezuela: ♂, Merida. Colombia: 7 ♂, 3 ♀, La Morelia; 3 ♂, ♀, San Agustín; 3 ♀, Buenavista (Huila); 2 ♂, La Candela; 4 ♀, o, Moscopan; ♂, ♀, Ibagüe; ♀, Toché; o, Honda; 2 ♂, Virolin, Santander del Sur. Ecuador: ♀, mouth of the Rio Curaray.

B. m. insidiatrix, Venezuela: 2 ♀, Cariaquito; ♂, ♀, Pedernales; ♀, Turmero; ♂, ♀, Maracay; ♂, Parapara; ♂, ♀, San Julian. Colombia: ♂, Carraipia, La Goajira; ♂, Maicao; ♀, Rio Hacha; ♂, ♀, Don Diego; ♂, Fundacion; ♀, Trojas de Cataca; ♂, Punto Cayman; ♀, Puerto Sagoc, Magdalena; 2 ♀, Ayacucho, Magdalena; ♂, Codazzi, Magdalena; ♂, Guamalito, Santander del Norte; o, Aguado de Pablo, Atlantico; ♀, Turbo; ♀, Rio Jurubidá; ♂, ♀, Rio Baudó. Panama: 3 ♂, 3 ♀, Permé; o, Rio Chubaquy (intermediates).

B. m. petulans, Panama: ♂, Garachiné; ♀, Gatún; ♀, Canal Zone; o, unspecified. Costa Rica: ♀, Pigres; o, La Palma; o, unspecified.

B. m. alius, Pearl Islands: 5 ♂, ♀, San José Island.

B. m. argutus, Costa Rica and Nicaragua: a series.

B. m. ecuadoriensis, Colombia: o, Retiro; ♂, ♀, Laguneta; ♂, Salento; 3 ♂, ♀, El Tambo; 2 ♂, 3 ♀, o, Popayan; 3 ♂, 5 ♀, Munchique; ♀, Ricaurte. Ecuador: ♂, Esmeraldas; 2 ♂, ♀, Bucay.

B. m. occiduus, Peru: ♂, Rio Jalashte; ♂, Tamborapa; ♀, Iquitos; ♂, Idma; ♂, ♀, Rio Cumbreciato; ♂, ♀, San Juan, Chanchamayo.

B. m. inca, Peru: ♂, ♀, La Oroya; o, Inca Mine.

B. m. saturatus, Bolivia: ♀, Chatarona; ♀, Calabatea; ♀, Susi; ♂ Santa Ana; ♂, " Yungas "; ♀, Incachaca; ♀, Samaipata; ♀, Buenavista; ♂, Tomina; ♀, Rio Lipeo; ♂, Bermejo.

B. m. superciliaris, Brazil: 3 ♂, 2 ♀, Descalvados, Matto Grosso.

B. m. nattereri, Brazil: ♀, Victoria, S. Paolo; 2 ♂, Fazenda Transvaal, Rio Verde, Goyaz.

Measurements in millimeters

	Wing	*Average*	*Tail*	*Average*
magnirostris				
Guianas				
5 ♂	207-230	215.2	142-153	148
3 ♀	223-231	227.6	147-159	153.6
8 o	211-228	220.5	142-165	150.4
La Morelia				
8 ♂	.212-227	221.8	136-156.5	146.3
3 ♀	211-220	214.1	142-153	146
Magdalena Valley				
7 ♂	215-225	219.5	147.5-158	152.7
10 ♀	222-247	231.9	150-168	159.4
insidiatrix				
11 ♂	202-225	216.2	134-160.5	149
13 ♀	200-232	230	139-165	150.4
ecuadoriensis				
14 ♂	215-237	224	145-168.5	155
10 ♀	220-238	228.2	148-166	158.9
occiduus				
5 ♂	210-223	216	141-152	147.5
2 ♀	215-230	222.5	146-166	156
inca				
♂	225		160	
♀	233		171	
o	238		171	
saturatus				
4 ♂	248-258	252	165-176.5	169.6
6 ♀	255-287	266.7	162-184	174.9
superciliaris				
3 ♂	216-227.5	220.1	144-155	148.3
♀	229		161	
o	210		254	

Acknowledgments. — I wish to express my appreciation to Dr. J. L. Peters of the Museum of Comparative Zoölogy for being so kind as to compare Peruvian specimens with the type and a series of *B. m. occiduus* and for lending me Guiana and Darien specimens.

Also I wish to thank Dr. Herbert Friedmann for his kindness in lending me a large amount of material from the collections of the United States National Museum.

NOTULAE NATURAE

NUMBER 157 OF AUGUST 1, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

ORTHOPTERA FROM ULITHI ATOLL, WESTERN CAROLINE ISLANDS, WITH THE DESCRIPTION OF A NEW SUBSPECIES OF VALANGA

BY JAMES A. G. REHN

Curator of Insects, Academy of Natural Sciences of Philadelphia

One of the most important groups of the western Caroline Islands is Ulithi Atoll, situated approximately four hundred miles southwest of Guam, in the Marianas, and one hundred miles northeast by east from the island of Yap. Hans Meyer, who considered the Ulithi group to be the greatest coral island group of the western Carolines,[1] gave its position as extending between 9°47′ and 10°7′ North, 139°37′ and 140°4′ East. He further stated the atoll had also been variously known as Ululssi, Ulussi, Uluti, Uliti, Ulewi, Ugeu, Egeu, the Mackenzie Islands, Los Reyes and Garbanzos.

Lieutenant-Commander Alfred Reginald Allen, U.S.N.R., a member of the Academy, who previously had done important entomological field work for it in southern Africa, visited Ulithi Atoll in war-time duties during the early part of the present year, and while there collected representatives of the insects which he observed. These he has kindly presented to the Academy. The present paper discusses the four species of Orthoptera represented, three of these being rather widely dispersed Pacific blattids, and the fourth a striking and undescribed subspecies of bird locust of the genus *Valanga*. The three blattid records are, as far as known at present, peripheral ones for the species in that portion of the Pacific, while the new *Valanga* carries the range of the species of which it is a striking subspecies east of the southern Philippines, where its nearest known relative occurs.

The Academy is deeply indebted to Commander Allen for this interesting representation.

---

[1] Das Deutsche Kolonialreich, II, p. 367, (1910).

BLATTIDAE

Loboptera dimidiatipes (I. Bolivar)

1890. *Temnopteryx dimidiatipes* I. Bolivar, An Soc. Españ. Hist. Nat., XIX, p. 300, pl. 1, fig. 1 [♀; Causip (err. pro Cauit ?), Camarines Sur[, Luzon, Philippines]]

Asor Island; IV, 2, 1945; 1 ♂.

Hebard[2] has already discussed in detail the considerable synonymy of this quite widely distributed small species of cockroach, which apparently has been spread by commerce from the east coast of Africa to the Hawaiian Islands.

From Polynesia and Micronesia *dimidiatipes* has previously been reported as occurring in Hawaii, Samoa, the Fijis, New Caledonia, Tahiti and the Marquesas. Comparison of the Asor Island individual has been made with material from a number of localities in the Marquesas, New Caledonia, Hawaii, Mahé in the Seychelles, Gran Comoro in the Comoros and Pemba Island off the east coast of Tanganyika Territory, east Africa.

Cutilia soror (Brunner)

1865. *P[olyzosteria] soror* Brunner, Nouv. Syst. Blatt., p. 219. [♂; Amboina[, Moluccas]]

Fassarai Island; III, 28, 1945; 1 ♀.

This species, like the preceding, is widely spread in the Pacific area, and doubtless has been distributed by commerce, but does not seem as yet to have penetrated the Indian Ocean region. It has already been recorded from islands extending from Formosa to a number of those of the Hawaiian group, and southward to Ceram, Amboina, New Caledonia, the Fijis, Samoa, Tahiti and the Marquesas, and it is here added from Mangareva in the Tuamotu archipelago.[3]

Cutilia soror (Brunner)

1865. *Platyzosteria nitida* Brunner, Nouv. Syst. Blatt., p. 214 [♂, ♀; Amboina and Ternate[, Moluccas].]

Asor Island; IV, 2, 1945; 1 ♂.

This species similarly is one of rather broad distribution in the Pacific area, doubtless transported by commerce. It has been reported from localities reaching from Formosa, the Philippines, Ceram and Australia, eastward across the New Hebrides, the Fijis, Samoa, Tonga and the Marquesas to as far as Fakarava in the Tuamotus. Material before me at this writing, in addition to that from Ulithi Atoll, is from Sibuyan in the Philippines,

---

[2] Bern P. Bishop Mus. Bull. 114, p 121, (1933).

[3] Mt Duff, Mangareva, Tuamotus; II, 3, 1905; (U.S.S Albatross); 1 ♂; [Hebard Cln.].

Ceram, Astrolabe Bay in New Guinea, the Fijis, and a number of localities in Australia and in the Marquesas group.

ACRIDIDAE

Valanga nigricornis alleni[4] new subspecies Figs. 1-8

In coloration this is one of the most striking bird-locusts I have seen. A careful study of the considerable recent literature on the genus, in which a number of new species and subspecies have been described, and a full comparison with the forms now represented in the Academy series, induces me to regard it as a subspecies of the plastic *V. nigricornis*. This species is now considered to break up into approximately twenty subspecies over its range, which extends from the lower Malay Peninsula and Sumatra, with the adjacent Mentawei group and more northern Wai Island, eastward and northeastward to the Philippines, New Guinea and the Aru Islands. However, the exact relationships to this great species complex of numerous other forms, which have been regarded by a number of authors as distinct species, have been but imperfectly defined, and these must be considered in similar fashion in weighing the differentiation of *V. n. alleni*

When compared with the other forms of *nigricornis*, nearest affinity is seen to be with *V. n. moro* Rehn and Rehn, known from several localities in Davao Province of Mindanao, Philippines,[5] and as in that subspecies *V. n. alleni* is very definitely dichromatic.[6]

The general form in both sexes of the present subspecies is very similar to that of *n. moro*, except that the body is somewhat more slender and compressed, this particularly evident in the head and pronotum, the fastigio-facial angle as seen in both profile and from dorsum is somewhat more decided, the median carina of the pronotum is slightly less elevated, the cephalic and median femora are less inflated and the caudal ones, by a difference in their outline and paginal proportions, appear less robust and more slender and attenuate, while the coloration in both phases is markedly distinct in its preponderance of solid sooty black, which in the lineate phase does not leave unobscured a broad caudal pale border of the pronotum, that is such a marked feature of the extreme lineate condition of *V. n. moro*.

---

[4] In honor of its collector, my long-time friend, Lieutenant-Commander Alfred Reginald Allen, U.S.N.R.

[5] Proc. Acad. Nat. Sci. Phila., XCII, pp. 261, 264, text-figs. 2, 8, 12 and 14, pl. 9, fig. 17, pl. 10, figs. 20 and 21, (1941).

[6] For a discussion of dichromatism in this genus see Rehn and Rehn, Proc. Acad. Nat. Sci. Phila., XCII, pp. 259-260, (1941).

The present form has been physically compared with material of the following additional subspecies of *V. nigricornis*, and found more distinct from them in various features than it is from *V. n. moro*, with which it has been contrasted above: *V. n. nigricornis* (Burmeister), of the Malay Peninsula; *V. n. sumatrensis* Uvarov, of Sumatra; *V. n. melanocornis* (Serville), of Java; *V. n. alorensis* Uvarov, of Alor Island, Lesser Sundas; *V. n. waiensis* Rehn, of Wai Island; and *V. n. disparilis* (Kirby), of Christmas Island. Also it has been compared with representatives of other elements of that species and of other species of the genus in series as yet unstudied.

On the basis of least distance from Ulithi Atoll the closest geographic relative among the various forms of Valanga is the Guam *V. excavata* (Stål),[7] the unique type of which from the Stockholm Museum was the sole specimen known to Uvarov when he prepared his classic study of the bird locusts of the Old World. Fortunately, I have been able to examine a series of both sexes of this species, which will be reported in detail in the near future, and Stål's species is widely distinct from the form here described. The most obvious differences of *excavata* from the present form, in addition to its relatively uniform leather-brown color tone, with cloud maculate tegmina and quite pale caudal tibiae, are the definitely more sharply cut and more elevated median carina of the pronotum, and the shorter limbs, particularly the cephalic and median, with the caudal femora in addition proportionately more slender in both aspects. Whether *excavata* is dichromatic remains to be determined, but there is no indication of such a condition in the material now before me.

The wing coloration and the major pattern of the caudal femora in *V. n. alleni* suggests *V. melanoptera* Sjöstedt, of New Guinea,[8] but the form of the male cerci and of the subgenital plate in that species are quite different from those of *V. n. alleni*, while *melanoptera* also possesses reddish fuscous caudal tibiae with red-based spines, and has the fastigio-facial angle much more broadly rounded in profile.

Type.— ♂; Asor Island, Ulithi Atoll, western Caroline Islands. April 2, 1945. (Lieut.-Comm. A. R. Allen.) [Academy of Natural Sciences of Philadelphia, Type no. 5713.]

Size medium (for the genus): form moderately slender, particularly the pronotum, appreciably more so than in *V. n. moro*, alar organs surpassing the apices of the caudal femora by definitely less than the pronotal length.

---

[7] Kongl. Svenska Freg. Eugenies Resa, Zool., 5, p 326. (1861). [♂; Guam[, Marianas Islands].]

[8] Arkiv för Zoologi, 23A, no. 4, pp. 4, 17, figs. 5 and 6, (1931) [♂, ♀; Kaiser Wilhelms Land (=northeastern), New Guinea.]

Head essentially as already described in detail for V. *n. moro* with the following differences: fastigio-facial angle less broadly rounded, as seen in profile somewhat more produced; excavated area of fastigial disk subequal in length and breadth; eyes slightly more prominent than in V. *n. moro*, greatest width across same (as viewed in cephalic aspect) appreciably greater than that across genae (as 5.7 to 5). Antennae equal in length to slightly more than twice that of the pronotum (median) (as 20.5 to 9.2).

Pronotum relatively slender, with greatest prozonal width (i.e. across lateral lobes) but slightly greater than prozonal length (as 5 to 4.5), constriction at principal sulcus very slight and no more evident than in V. *n. moro*, greatest width of metazonal disk contained one and seven-tenths times in the pronotal length; caudal margin of pronotal disk slightly more produced than in V. *n. moro*, its angle sharper and as a whole but slightly broader than a right angle; surface of prozontal disk more finely cicatricose than in V. *n. moro*, metazonal surface with the larger scale cicatriform sculptural features proportionately smaller than in *moro*, cribrose sculpture of pronotum in size, density and depth essentially as in latter; lateral lobes slightly more longitudinal than in V. *n. moro*

Tegmina surpassing the abdominal and caudal femoral apices by appreciably less than the median pronotal length, the distance equalling not more than three-fourths of the latter, general form, proportions and venation as in V. *n. moro*. Wings with greatest breadth contained but faintly more than twice in the length of the same.

Prosternal spine with outline and degree of compression as in V. *n. moro*, but axis more vertical and not distinctly, even though moderately, inclined caudad as in *moro*. Interspace between mesosternal lobes definitely narrower than in V. *n. moro*, but otherwise of the same general outline, cephalic breadth of interspace contained one and three-quarters times in the length of same, meso-caudal angles of lobes definitely acute: metasternal lobes somewhat more broadly in contact mesad than in V. *n. moro*.

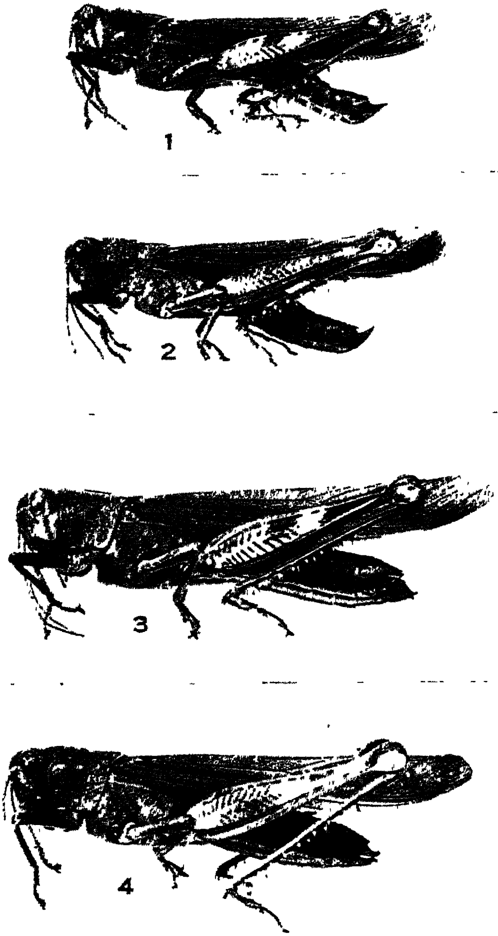
Supra-anal plate and cerci as in V. *n. moro*.[9] Subgenital plate in outline and acuteness as in *moro*, but ventral profile of plate straighter and the whole more evenly attenuate distad.

Cephalic and median limbs appreciably more slender than those of V. *n. moro* as seen in both dorsal and lateral aspects. Caudal femora in general form appearing more attenuate than in *moro*, as while the greatest depth is contained but four and seven-tenths times in the femoral length (or exactly 4.72),[10] the tapering genicular section is more concavely narrowing distad and the external pagina is of lesser vertical depth in proportion to that of the whole femur, external pagina more flattened than in *moro*,

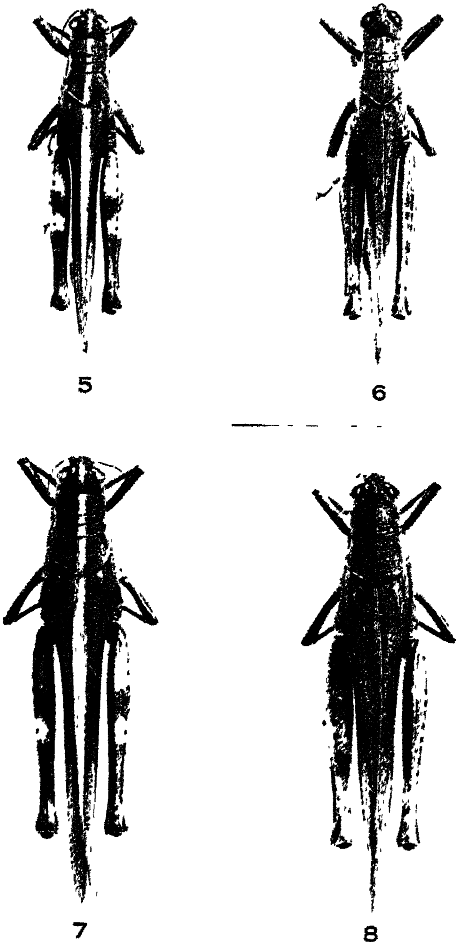
---

[9] See Rehn and Rehn, Proc. Acad. Nat Sci Phila., XCII, p. 251, fig. 2.

[10] Due to a lapsus calami in the original description of V. *n. moro* (Proc Acad Nat. Sci Phila., XCII, p. 268) the depth of the caudal femora is given as contained slightly more than "five and one-half times (exactly 5.53) in the femoral length" This should be four and seven-tenths times (or exactly 4.77) in the type of *moro*.



Valanga melanocornis alleni new subspecies Lateral views. (Natural size.) Fig. 1—Male (*type*), striped phase. Asor Island. Fig. 2.—Male (*paratype*), unicolorous phase, Fassarai Island. Fig 3.—Female (*allotype*), striped phase, Mogmog Island. Fig. 4—Female (*paratype*), unicolorous phase Fassarai Island



Valanga melanocornis alleni new subspecies. Dorsal views. (Natural size.) Fig 5.—Male (*type*), striped phase, Asor Island. Fig. 6—Male (*paratype*), unicolorous phase, Fassarai Island. Fig. 7.—Female (*allotype*), striped phase, Mogmog Island Fig 8.—Female (*paratype*), unicolorous phase, Fassarai Island

all external carinae more sharply modelled, spaced serrulations of dorso-external carina somewhat more pronounced than in V. *n. moro*, genicular lobes with their outline broad and full as in *moro;* caudal tibiae with eight external and eleven internal spines,[11] the latter, as usual in the species, as a whole much longer and definitely more curved, both incurved and curved proximad, than the external ones.

Allotype.—♀; Mogmog Island, Ulithi Atoll, western Caroline Islands. April 1, 1945. (Lt. Comm. A. R. Allen.) [Academy of Natural Sciences of Philadelphia.]

Differing from the above description of the type in the following noteworthy features:

Size, as usual in female, definitely larger; form proportionately as slender as that of the male, when compared with female sex of V. *n. moro*, alar organs surpassing apices of caudal femora by slightly less than the pronotal length.

Head with relative production of fastigio-facial angles as seen in profile somewhat less than in male, but with the arcuation of the inter-antennal outline, in the same aspect, more pronounced than in the female of V. *n. moro;* excavations of fastigial disk with its breadth equal to one and one-half times its median length. Antennae slightly less than twice as long as pronotal disk.

Pronotum proportionately somewhat more robust than in male, but definitely more slender than in the female sex of V. *n. moro*, greatest prozonal width (i.e., across lateral lobes) somewhat greater than length of prozona (i.e., as 6.75 to 6), virtually unconstricted at principal sulcus, greatest width of metazonal disk contained slightly more than one and one-half times (1.54) in the pronotal length; caudal margin of pronotal disk slightly more broadly obtuse than in male, but also somewhat sharper than in the same sex of V. *n. moro*.

Tegmina surpassing the abdominal and caudal femoral apices by but slightly less than the median pronotal length.

Prosternal spine of the general shape seen in the male sex, as in the female of V. *n. moro* with greater longitudinal depth than in the male, its axis somewhat more inclined caudad than in the male. Interspace between mesosternal lobes of similar cuneiform shape but slightly narrower than in female sex of V. *n. moro;* metasternal lobes narrowly separated, their internal margins moderately arcuate.

Supra-anal plate essentially as in the female of V. *n. moro*, equally compressed. Cerci of same general shape as in *moro*, but slightly shorter and deeper proximad. Ovipositor valves somewhat more slender and compressed as seen in both dorsal and ventral aspects when contrasted with those of *V. n. moro*, in profile the curvature of the dorsal valves is slightly less marked.

---

[11] These figures are also the average for the series seen, the exceptions being two female paratypes from Fassarai Island which have nine external spines, and one male paratype from the same island and a female paratype from Asor Island having ten internal spines.

Cephalic and median limbs quite definitely more slender than those of the same sex of *V. n. moro*, and very appreciably more so than in the male sex of *n. alleni.* Caudal femora definitely more slender than in the female of *V. n. moro*, the greatest depth being contained nearly five times in the femoral length (actually 4.92 in the allotype), other femoral characteristics in accord with those of the male sex; caudal tibiae as in male.

Coloration.—While the series before me is not extensive, it shows clearly the dichromatism of this subspecies, which is even more marked than that of *V. n. moro.* Typical material of each of the phases is here described, followed by relevant comments on both. The striped phase bears an amazing superficial similarity to the same condition of the North American *Schistocerca alutacea.*

Unicolored phase. Pale base color tawny to mikado brown or pecan brown (of Ridgway) on face, genae, mouthparts, pleura, and even zinc orange on the caudal femora, overlaid with a heavy wash of dark olive to dark grayish olive, this virtually solid on the pronotal dorsum and on the occiput and fastigium, the abdomen substantially of this tone with the basal brownish showing in some areas, as on parts of the male genitalia, and particularly the subgenital plate; genae with a solid vertical infra-ocular line, and dottings on frontal costal margins and much of lateral lobes of pronotum dark olive; cephalic and median limbs largely of the dark olive tone, median tibiae ventrad brownish; caudal femora with the zinc orange base color strong distad, usually duller proximad, crossed dorsad by two rather indefinitely defined bars of dark olive, which are also rather suffusely evident on the external pagina, internal face almost solidly olive, pregenicular pale annulus alone breaking this, genicular arches and definite blotch at proximal base of same olive, genicular lobes clear zinc orange, ventral sulcus and ventro-external face largely olivaceous; caudal tibiae olivaceous black with flexor surface yellowish olive to ecru-olive, rarely as golden as dull honey yellow (one Fassarai Island female) distad, spines primuline yellow, black tipped, distal spurs olive ocher, black tipped; caudal tarsi blackish, tarsal claws sometimes yellowish proximad. Antennae almost black. Eyes blackish to prout's brown.

Striped phase. Pale base color zinc orange to ochraceous-orange (of Ridgway), overlaid quite solidly with olivaceous black, giving a very decided and striking pattern, which can be summarized as follows: margins of frontal costa, lateral facial carinae, infra-ocular vertical bar on genae, medio-proximal sections of both clypeus and labrum, mandibles and antennae solidly dark; occiput almost solidly dark with a medio-longitudinal pale bar which extends continuously caudad over the dorsum of the pronotum and sutural section of the anal fields of the tegmina; lateral lobes of pronotum ranging from solidly dark to bearing a few pale flecks, lateral sections of metazonal disk may (usually) or may not show yellowish areas along the caudal margin, when present having a few more or less distinct dark maculae on low surface nodules; cephalic limbs ranging from almost solidly blackish to having quite a little yellow clouding scattered over the cephalic face and less frequently the proximal extremity of the femora; median limbs with femora almost always yellowish clouded to annulate proximad; caudal femora with proximal half largely zinc orange, plus genicular lobes and much of dorsum of genicular extremities, remainder olivaceous black, this also present as a limited area dorso-proximad, a slightly premedian transverse bar dorsad and a much broader pregenicular area, which is really a broad annulus, external face with premedian bar extending ventro-proximad and becoming obsolete, external paginal carinae ticked with olivaceous-black and carinal serrations similarly marked, ventral face solidly olivaceous black, internal face solidly dark (in single Fassarai Island striped male) or with the dorsal post-median pale band also indicated on that face; caudal tibiae and tarsi solidly olivaceous black, spines dull honey yellow, black tipped, spurs as in unicolorous phase. Wings in both phases infumate with weak fuscous, the veins pencilled with fuscous-black.

The unicolorous phase is represented by one male and two females from Fassarai Island, the striped phase by two males (including the type) and one female from Asor Island, one male from Fassarai Island, and three females (including the allotype) from Mogmog Island. One female from Fassarai Island while nearer the striped phase is tending toward the unicolorous one, in that the pale dorsal stripe is less emphasized and much duller and narrower on the pronotum.

As in the representation of V. *n. moro* studied in 1941, it would seem as if the striped phase is more frequent than the unicolorous one, at least on the basis of material collected. Commander Allen believed he had two species and doubtless, as an insect collector of considerable experience, he endeavored to secure additional material of the more dully colored phase. From this we may assume the striped phase is the more frequent.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur
♂, Asor Island, paratype.....	43	9.1	36.5	23.6
♂, Asor Island, type.........	43.8	9.5	37.4	24
♂, Fassarai Island, paratype	42[12]	9.6	39	24.8
♀, Asor Island, paratype.. ..	54	12	47	30
♀, Fassarai Island, paratype .	52	11.6	48.3	30.5
♀, Mogmog Island, paratype.	55	12	49.7	30.8
♀, Mogmog Island, paratype.	58	12.8	49	32.3

---

[12] Subgenital plate directed more dorsad than in the other males measured, hence body length proportionately shorter.

Paratypes.—All the adults before me in addition to the type and allotype are here regarded as paratypes, these consisting of three males and six females from Asor, Fassarai and Mogmog Islands, all in the collection of the Academy of Natural Sciences of Philadelphia. The detailed data for these specimens are given at the end of this description.

Immature stages.—Immature individuals before me represent four instars preceding maturity. Of these, two were taken on Fassarai Island, March 28, 1945, and five on Mogmog Island, April 1, 1945. On the latter date on Mogmog Island three instars were taken, being all of those represented except that next to the youngest. The immature specimens in the greater part are of various shades of almost uniform green, but two are of a brownish tone with distinct transverse dark dorsal bars on the caudal femora, one of these from Fassarai Island, the other from Mogmog Island. There is nothing to indicate any association of either of these two color types with one or the other of the two marked ones of the adult condition. However, both of the brownish type are immature males. All of the greenish individuals, which represent both sexes, have the caudal tibiae shades of pale green and the caudal femora are without darker bars dorsad.

Specimens examined.—11 adults; 4 ♂, 7 ♀.

ULITHI ATOLL: Asor Island; IV, 2, 1945; (Lt.-Comm. A. R. Allen); 2 ♂ (*type* and *paratype*), 1 ♀ (*paratype*); [A. N. S. P.]. Fassarai Island; III, 28, 1945; (Lt.-Comm. A. R. Allen); 2 ♂, 3 ♀ (*paratypes*); [A. N. S. P.]. Mogmog Island; III, 13 and IV, 1, 1945; (Lt.-Comm. A. R. Allen); 3 ♀ (*allotype* and *paratypes*); [A. N S. P.].

NOTULAE NATURAE

NUMBER 158 OF NOVEMBER 2, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTIONS OF TWO NEW FRESH-WATER FISHES FROM COLOMBIA

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

During the autumn of 1940 Mr. Cecil Miles sent to the Academy several installments of fresh-water fishes, totalling 118 specimens representing 32 species, of which 2 appear to be undescribed. While most were obtained at Honda, or its vicinity, others were secured in the Rio Meta basin at Villavicencio. Our thanks are again due to Mr. Miles for this gift to the museum, as well as for the interesting notes, sketches and photographs accompanying the specimens. As in my previous papers, more especially one dealing with Mr. Miles' former collections,[1] references to known species are given only to those not previously noticed.

DASYATIDAE

Potamotrygon magdalenae (Valenciennes)

Taeniura magdalenae Valenciennes, in Duméril, Hist. Nat. Elasmobr., pt. 1, 1865, p. 625 (type locality, Rio de la Magdalena).

Potamotrygon magdalenae Garman, Mem. Mus. Comp Zool., vol. 36, 1913, p. 421 (Magdalena River).

One, 230 mm. long, disk width 100 mm., Honda. Dark reticulations much larger and less numerous, though equally connected, than are indicated in Steindachner's figure of *Taeniura magdalenae* in 1878. They also extend entirely over the middle of the back.

CHARACIDAE

CURIMATINAE

Curimata magdalenae Steindachner

One, 153 mm., Mariqueta, May 1941.

---

[1] Notulae Naturae, Acad. Nat. Sci. Phila., no. 33, Dec. 6, 1939, pp. 1 to 7; no. 73, March 7, 1941, pp. 1 to 10, figs. 1 to 11.

PARODONTINAE

Parodon suborbitalis Valenciennes

One, 110 mm., Tolmia, Oct. 1940.

PYRRHULININAE

Copeina metae Eigenmann

Copeina metae Eigenmann, Indiana Univ. Studies, no. 23, 1914, p. 229 (type locality, Barrigon, Rio Meta); Mem. Carnegie Mus., vol. 9, no. 1, 1922, p. 233, pl. 20, fig. 3 (types).

One, 27 mm., Villavicencio, Oct. 1940.

Pyrrhulina lugubris Eigenmann

Pyrrhulina lugubris Eigenmann, Mem. Carnegie Mus., vol. 9, no 1, Oct. 1922, p. 231, pl. 21, fig. (photograph) (type locality, Barrigon; Quebrada Cramalote; Rio Negro; Cumaral).

One, 54 mm., Honda, Oct. 1940.

TETRAGONOPTERINAE

Tetragonopterus argenteus Cuvier

One, 78 mm., Villavicencio, May 1941.

Moenkhausia oligolepis (Gunther)

Tetragonopterus oligolepis Gunther, Cat. Fish. Brit. Mus., vol. 5, 1864. p. 327 (type locality, British Guiana).

Moenkhausia oligolepis Eigenmann, Mem. Mus. Comp. Zool., vol. 43, pt. 1, 1917, p. 78, pl. 7, fig. 4 (photograph), pl. 95, fig. 4 (radiograph), pl. 100, fig. 5 (outline head) (Amazons, Guiana).

One, 41 mm., Honda, Oct. 1940. In Colombia reported only from the Cordillera Oriental, Cano Carniceria.

Hemigrammus barrigonae Eigenmann and Henn

Hemigrammus barrigonae Eigenmann and Henn, Indiana Univ. Studies, no. 24, 1914, p. 232 (type locality, Barrigona, Rio Meta).—Eigenmann, Mem. Carnegie Mus., vol 43, pt. 2, 1918, p. 161, pl. 93, fig. 2 (types).

One, 40 mm., Villavicencio, Oct. 1940; five, 38 to 44 mm., Honda, Oct.-Nov. 1940.

Astyanax fasciatus (Cuvier)

Sixteen, 65 to 104 mm., Honda, Oct.-Nov. 1940.

Hemibrycon dentatus (Eigenmann)

Brycohamericus dentatus Eigenmann, Indiana Univ. Studies, no. 18, 1913, p. 19 (type locality, Piedra Moler; Paila; Cauca at Cali; Penas Blancas).

Hemibrycon dentatus Eigenmann, Mem. Mus. Comp. Zool., vol. 43, pt. 4, May 1927, p. 414, pl. 39, fig. 3 (photograph), pl. 76, figs. 10, 12, 14, pl. 80, figs. 3, 5, 7-11 (dentition) (Colombian localities)

Seven, 73 to 104 mm., Honda, Oct.-Nov. 1940. Eigenmann suggested his four Villavicencio specimens "may represent a distinct species." With the present specimens for comparison with his account and figures, it seems clear to me that the species is more variable than he sets forth. He describes the maxillary with far fewer teeth than in most of my specimens. Although he says the caudal lobes have a basal sheath, this is variable, as most of my specimens have 2 enlarged basal scales.

Argyropleura conventa (Eigenmann)

Bryconamericus conventa Eigenmann, Indiana Univ. Studies, no. 18, 1918, p. 13 (type locality, Soplaviento).

Argyropleura conventa Eigenmann, Mem. Mus. Comp. Zool, vol. 43, pt. 4, 1927, p. 396, pl. 36, fig. 2 (photograph) (types).

Fifteen, 21 to 61 mm., Honda, Oct.-Nov. 1940. Eigenmann's account gives 5 scales both above and below the lateral line. His photographic figure of the type would show 7 above and 6 below, likely drawn in afterward by an engraver or artist? My largest specimen shows 8 above and 8 below, and the small specimens with 6 above and as many below. Some specimens with the vertical fins more or less greenish yellow.

Hyphessobrycon inconstans (Eigenmann and Ogle)

Hemigrammus inconstans Eigenmann and Ogle, Proc. U. S. Nat. Mus, vol. 33, 1907, p 17, fig. 8 (type locality, Para?).

Hyphessobrycon inconstans Eigenmann, Mem. Mus. Comp. Zool., vol. 43, pt. 2, 1918, p. 199, pl. 27, figs. 1-2 (photograph), pl. 33, figs. 1-2 (photographs), pl. 78, fig. 5 (premaxillary), pl. 79, fig. 2 (maxillary) (Colombian localities).

One, 56 mm., Honda, Nov. 1940.

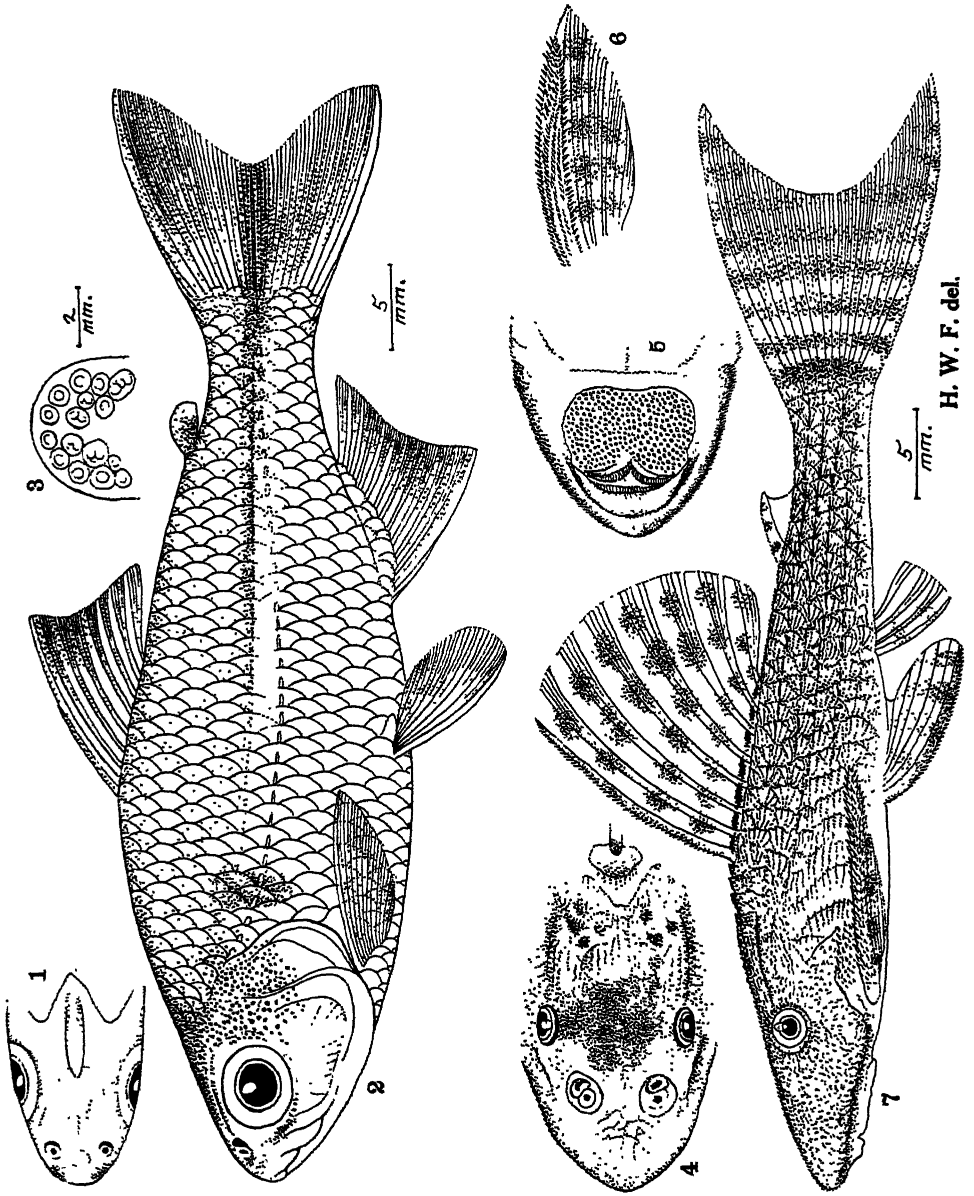
Creagrutus magdalenae Eigenmann

Creagrutus magdalenae Eigenmann, Indiana Univ. Studies. no. 18, 1913, p 8 (type locality, Girardot; Honda; Penas Blancas; Apulo); Mem. Mus. Comp. Zool., vol. 43, pt. 2, 1918. pl. 80, figs 12-16 (outline dentition).

Two, 57 to 70 mm., Honda, Nov. 1940.

Creagrutus londonoi new species Figures 1 (head from above), 2 (lateral view) and 3 (upper dentition).

Depth 3 to $3\frac{1}{8}$; head $3\frac{1}{4}$ to $3\frac{3}{7}$, width $1\frac{2}{3}$ to $1\frac{3}{4}$. Snout (in profile) 4 to 5 in head, protrudes in front; eye $2\frac{3}{4}$ to $3\frac{1}{8}$, greatly exceeds snout, subequal with interorbital; maxillary reaches little beyond front of eye, length from snout tip $2\frac{3}{4}$ to $3\frac{1}{4}$ in head; lower lip broad, coriaceous; 3 rows of teeth above and outer row of 5 or 6 smaller teeth each side; maxillary with 1 or 2 very small teeth, subbasal or at upper inner edge; mandible with row of 6 large strong teeth; interorbital 3 to $3\frac{1}{8}$ in head, convex; fontanel distinct, begins in middle of interorbital and extends to base of occipital extension;



FIGURES 1 TO 3.—*Creagrutus loudonoi* new species.
FIGURES 4 TO 7.—*Plecostomus winzi* new species.

broad suborbitals cover cheek, not in contact with ridge of preopercle below. Gill opening extends forward opposite first third in eye. Gill rakers $5 + 7$ short denticle-like points, some bifid, longest $\frac{1}{3}$ of gill filaments which are $\frac{1}{2}$ of eye.

Scales 33 or $34 + 3$ in lateral line; 6 above to dorsal origin, 4 below to ventral origin, 4 below to anal origin, 11 or 12 predorsal. Scales rather large on chest and breast. Caudal base scaled. Anal with basal scaly sheath. Tubes in lateral line simple, each well exposed. A small paratype shows single row of minute contact hooks on each side of each ray.

D. iii, 7, i, first branched ray 1 to $1\frac{1}{2}$ in head; adipose fin subequal with eye to $1\frac{1}{4}$ in eye; A. iii, 11, i, first branched ray $1\frac{2}{5}$ to $1\frac{1}{2}$ in head; least depth of caudal peduncle $2\frac{1}{10}$ to $2\frac{3}{5}$; caudal 1, well emarginate behind, lobes rather broad; pectoral $1\frac{1}{2}$, rays i, 11; ventral rays I, 7, fin $1\frac{1}{2}$ to $1\frac{3}{4}$ in head.

Color in alcohol with back pale olive buff, each scale with dark margin. Top of head like back. Iris silvery white. Snout dull brown. Axial lateral band ill-defined on trunk, narrow and better indicated as well as darker on caudal peduncle and continues on median caudal rays as blackish gray. Deep dark post-humeral bar, 3 scales wide, deeper than vertical diameter of eye. Preorbital and postocular dusted with dark gray. A distinct small black spot, half size of pupil, at bases of 4 median caudal rays. No distinct dark median line down back. Under surface of body white. Dorsal pale buff green basally, gray terminally. Adipose fin gamboge, with dark dots. Caudal greenish, gray marginally. Anal greenish yellow in front, rest of fin largely gray and more or less gray black marginally. Paired fins pale to whitish, with buff yellow medially on ventral.

A. N. S. P., no. 71610. Honda, Colombia. November 1940. Length 67 mm. Type.

A. N. S. P., no. 71611 to 71619. Same data as type. Length 44 to 64 mm. Paratypes. A.N.S.P., no. 71620. Honda. October 1940. Paratype.

Resembles *Creagrutus notropoides* Meek and Hildebrand,[2] which is shown with the median caudal rays dark basally, though described with " sides with a plumbeous lateral band . . . caudal spot wanting; fins unmarked." The dark median caudal rays appear to distinguish it from the other Colombian species. It differs further in having but 3 scales between the lateral line and the ventral origin.

(For Señor David Londoño Posada, of Mariquita, Colombia.)

STEVARDINAE

Gephyrocharax melanocheir Eigenmann

Two, 44 to 45 mm., Honda, November 1940.

---

[2] Field Mus. Publ., Zool. ser., vol. 10, 1912, p. 68 (type locality, Rio Indio, upper tributary of Rio Chagres, Panama); vol. 10, no. 15, Publ. no. 191, 1916, p. 289, pl. 21 (Rio Chagres).

Gephyrocharax chocoensis Eigenmann

Gephyrocharax chocoensis Eigenmann, Indiana Univ. Studies, no. 16, 1912, p. 23 (type locality, Istmina, Colombia); Mem. Mus. Comp. Zool., vol. 43, pt. 4, 1927, pl. 97, fig. 3 (radiograph).—Eigenmann and Myers, Mem. Mus. Comp. Zool., vol. 43, pt. 5, 1929, p 478 (Colombian localities).

Gephyrothorax chocoensis Eigenmann and Myers, op. cit, pl. 63, fig. 1 (photograph).

One, 50 mm., Honda, Oct. 1940. Dark blotch on caudal base reflected out on median caudal rays. Anal largely dark. Previously listed only from the Rio San Juan and Atrato basins.

GASTEROPELECINAE

Thoracocharax magdalenae Eigenmann

Thoracocharax magdalenae Eigenmann, Indiana Univ. Studies, no. 16, Dec. 1912, p. 25 (type locality, Girardot, Colombia); Mem. Carnegie Mus., vol. 9, no. 1, 1922, p. 15, pl. 24, fig. 4 (types).

One, 30 mm., Honda, Oct. 1940. Dark bar on back along base of dorsal fin. Dark submarginal line all along ventral profile of abdomen and anal fin base.

TRIPORTHEINAE

Triportheus magdalenae (Steindachner)

Chalcinus magdalenae Steindachner, Denks. Akad. Wiss Wien, vol. 39, 1879, p. 60, pl. 11, figs. 1-2 (type locality, Rio Magdalena).—Eigenmann, Mem. Carnegie Mus, vol. 9, no. 1, 1922, p. 156 (Colombian localities).

Two, 170 to 178 mm., Honda, Oct. 1940. Steindachner's figures both show the eye dark or blackish, but in both my specimens it is bright silvery white.

HYDROCYNINAE

Ctenolucius insculptus (Steindachner)

Luciocharax insculptus Steindachner, Denks. Akad. Wiss. Wien, vol. 39, 1878, p. 67, pl. 13, figs. 2-2b (type locality, Rio Magdalena).

Ctenolucius insculptus Eigenmann, Mem. Carnegie Mus., vol. 9, pt. 1, 1922, p. 167, pl. 26, fig. 5 (Rio Magdalena localities).

One, 73 mm., Honda, Nov. 1940; one, 116 mm., Rio Purnio above La Dorado, Rio Magdalena; one, 87 mm., Honda, Oct. 1940.

GYMNOTIDAE

Sternopygus macrurus Schneider

Two, 205 to 323 mm., Honda, Oct. 1940.

CYPRINIDAE (Introduced)

Carassius auratus (Linnaeus)

One, 48 mm., Honda, Nov. 1940.

PIMELODIDAE

Rhamdia wagneri (Günther)

Figures 8 (head above), 9 (dental plates), 10 (pectoral fin) and 11 (lateral view).

One, 161 mm., Honda, Nov. 1940.

PYGIDIIDAE

Pygidium romeri Fowler

Two, 53 to 82 mm., Villavicencio, Oct. 1940.

Eremophilus mutisii Humboldt

Eremophilus mutisii Humboldt, Recueil Observ. Zool. Anat., vol. 1, 1811, p. 17, pl. 6 (type locality, Bogotá).—Eigenmann, Mem. Carnegie Mus., vol. 7, no. 5, Sep. 1908, p. 341, pl. 41, figs. 1-2 (radiographs), pl. 54, figs. 1-2 (Bogotá Plain).

One, 133 mm., Bogotá Plains, May 1941, Mr. Carlos Winz. Mr. Miles describes it in life as: "Background of the fish yellowish, with 2 distinct mottlings overlaid, one, which is fainter is bluish and extends over the whole body, while the much heavier clearer exists only on the back and is coffee-colored and is overlaid on the fainter mottling. All fins with some red showing through between the rays and a tendency to pink along the center line of the body, especially in a strong light when there is some transparency. This pink marking is accentuated on the gill covers and on the caudal peduncle. Nostrils as red points. The small eyes are bottle green."

CALLICHTHYIDAE

Corydoras metae Eigenmann

Corydoras metae Eigenmann, Indiana Univ. Studies, no. 23, 1914, p. 230 (type locality, Barrigona, Rio Meta, Colombia); Ann. Carnegie Mus., vol. 9, no. 1. 1922, p. 277, pl. 9, fig. 5 (photograph of ventral surface) (type).

One, 50 mm., Villavicencio, Oct. 1940.

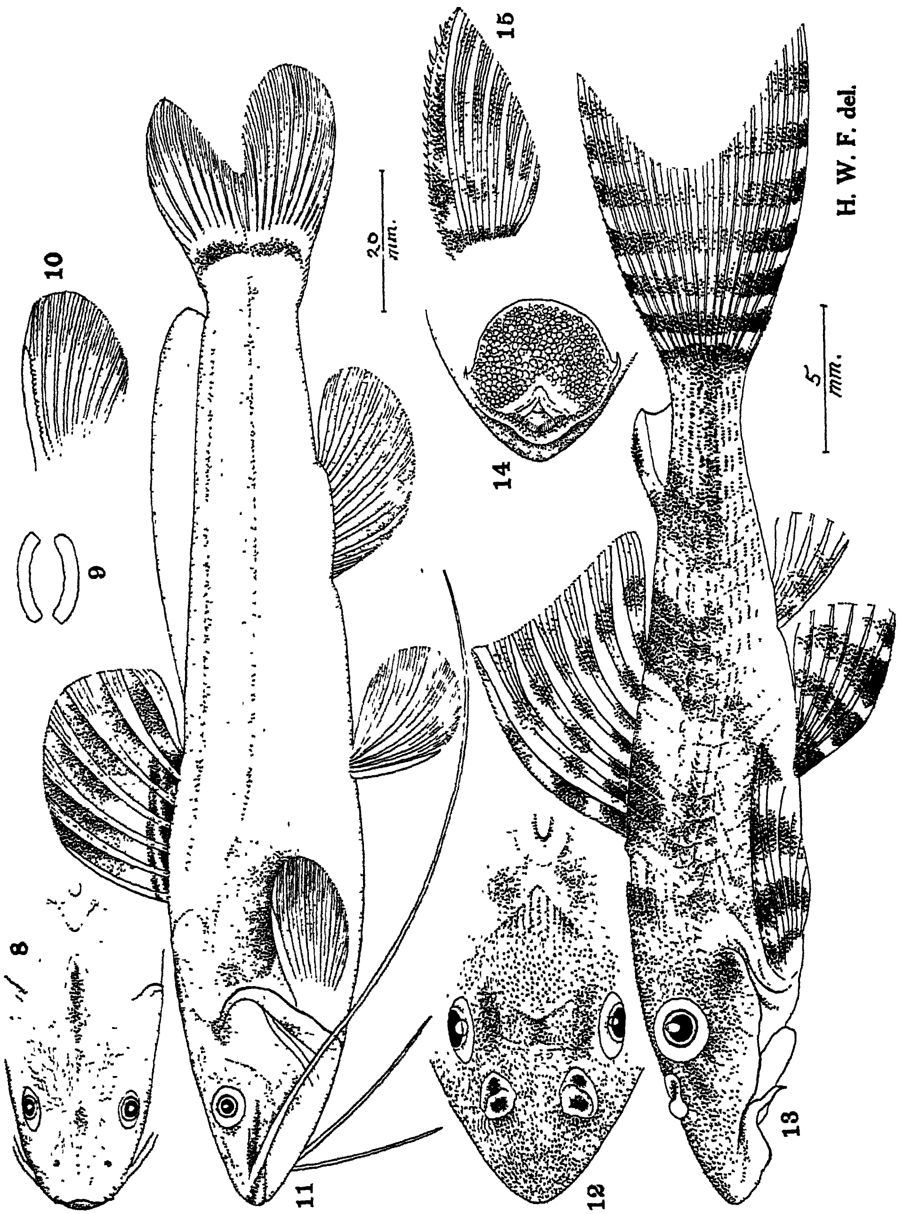
LORICARIIDAE

Cheiridodus hondae (Regan)

Figures 12 (head above), 13 (lateral view), 14 (buccal disk) and 15 (right pectoral fin).

Plecostomus hondae Regan. Proc. Zool. Soc. London, 1912, p. 666, pl. 76, fig. 3 (type locality. Honda, Colombia).

Depth $4\frac{7}{8}$; head $3\frac{1}{4}$, width $1 + \frac{1}{6}$ times its length. Snout (in profile) $1\frac{3}{4}$ in head, as seen from above, profile broadly triangular; eye $3\frac{7}{8}$, $2\frac{1}{4}$ in snout,



FIGURES 8 TO 11.—*Rhamdia wagneri* (Gunther).
FIGURES 12 TO 15—*Cheirndodus hondae* (Regan).

2 in interorbital; buccal disk slightly wider than long, length $1\frac{3}{4}$ in head; both lips papillate, broad, lower flap with fine papillae submarginally; interorbital 2 in head, low, flattened. Gill opening small.

Lepidosis incomplete; 22 myomeres in axial lateral count, little spinescent on trunk, more so on tail. Head largely spinescent above. Spines and edges of rays of fins spinescent.

D. I, 6, spine equals head and flexible terminally; adipose fin $2\frac{2}{5}$ in head; A. I, 4, length $2\frac{1}{6}$; least depth of caudal peduncle $3\frac{3}{5}$; caudal well forked, lower lobe longer or $2\frac{1}{2}$ in rest of fish; pectoral rays I, 6, spine flexible terminally, fin $1\frac{1}{10}$ in head; ventral $1\frac{1}{3}$, fin rays I, 5.

Color in alcohol brown above, paler to whitish below. Head with obscure dark cloudings and dark spot on opercle. On body 3 broad dark brown saddle like blotches, first at front of dorsal, second at last dorsal ray and behind fin, and third at adipose fin. Iris dark gray. Fins pale to transparent. Dorsal with 4 dark brown blotches on spine and anterior rays, and posterior rays with 3 dark brown blotches. Adipose fin with 2 dark brown spots on spine above. Anal with 3 brown blotches. Caudal with 7 dark brown transverse bands, basal nearly black and outer sixth and seventh bands incomplete owing to short median rays. Paired fins each with 4 transverse series of broad dark brown blotches.

One, 38 mm., Villavicencio, October 1940.

Varies greatly from the original description both in color and arrangement of its spots.

Plecostomus winzi new species

Figures 4 (head above), 5 (buccal disk), 6 (right pectoral fin) and 7 (lateral view).

Depth 5; head 4, width $1 + \frac{1}{6}$ times its length. Snout (in profile) $1\frac{1}{3}$ in head, with rather broadly convex profile as viewed from above; eye $5\frac{1}{4}$, $3\frac{3}{4}$ in snout, 3 in interorbital; buccal disk broad as long, its length $1\frac{3}{5}$ in head, papillate; each mandibular ramus $\frac{1}{3}$ of snout; teeth small, fine, slender, outer row of 24 above and row of 24 on each mandibular ramus; interorbital $1\frac{3}{4}$ in head, flattened, little depressed. Gill opening lateral, small, long as eye.

Scales as bony bucklers or scutes with rows of fine spinules, 24 in a lateral series. Head above, more or less spinescent, below smooth like entire breast and belly. Lateral line not distinct.

D. I, 7, spine terminally flexible and on front portion well spinescent, its length $1\frac{2}{5}$ in predorsal space; adipose fin behind depressed dorsal, length 3 in head, spine spinescent above; A. I, 3, rays feeble, spine slender and weak, length $2\frac{1}{8}$ in head; least depth of caudal peduncle $2\frac{2}{3}$; caudal $2\frac{1}{3}$ in rest of fish, deeply emarginate or crescentic behind with lower lobe longer; pectoral rays I, 4, flattened spine spinescent in front and above, though spineless shorter extent along upper hind edge than on outer front upper edge; ventral rays I, 5, spine $1\frac{1}{8}$ in head and spinescent along front edge.

Color in alcohol pale brown above with some darker obscured spots on the head above. Along each side of dorsal base, row of 7 blackish brown spots. Iris dark gray. Under surface of head and body cream white. Fins largely transparent. Dorsal with 4 blackish brown blotches on each ray and reflected on membrane of fin. Adipose fin spine with 3 dark brown spots. Caudal with 9 transverse dark brown bands, mostly broader than pale interspaces. Pectoral with 5 dark brown transverse bands, ventral with 4 and anal with 2. Belly all more or less dark grayish, due to dark peritoneum showing through.

A. N. S. P., no. 71623. Honda, Colombia. November 1940. Length 59 mm. Type.

Only the type known. I am unable to identify this species as the young of any known form, such as *Plecostomus tenuicauda* Steindachner,[3] as its coloration is so entirely different in general pattern and the fins and scalation altogether more spinescent.

(For Señor Carlos Winz, of the Optica Moderna, Bogotá.)

Chaetostoma milesi Fowler

Two, 104 to 108 mm., Rio Purnio above La Dorado, Rio Magdalena.

Loricaria magdalenae Steindachner

Loricaria magdalenae Steindachner, Denks. Akad. Wiss. Wien, vol. 39, 1879, p. 74 (type locality, Rio Magdalena); vol. 41, 1879, p. 52, pl. 7, figs. 2-2a, 3-a and b.—Eigenmann, Mem. Carnegie Mus., vol. 9, no. 1, Oct. 1922, p. 89, pl. 15, fig. 4 (ventral view photograph) (Soplaviento; Calamar; Quibdo; Managru; Raspadura; Truando).

One, 91 mm., Mariquita, May 1941.

Sturisoma leightoni (Regan)

Three, 120 to 148 mm., Honda, November, 1940. Also two, 148 to 157 mm., same locality, Oct. 1940, with well-developed lateral bristles and rather small eye, 2 in interorbital.

CYPRINODONTIDAE

Rivulus milesi Fowler

Eight, 37 to 55 mm., Honda, Oct.-Nov. 1940; two, 35 to 44 mm. Villavicencio, Oct. 1940. I separated this species from *Rivulus magdalenae* Eigenmann and Henn, as the hind caudal edge of the male is conspicuously yellow. In the original account of that species Eigenmann and Henn have not given any notice of this character, so prominent in the living fish.

---

[3] Denks. Akad. Wiss. Wien, vol. 39, 1878, p. 40, pl. 6 (type locality, Rio Magdalena).—Eigenmann, Mem. Carnegie Mus., vol. 9, no. 1, 1922, p. 69 (Saplaviento, Penas Blancas, Puerto del Rio, Apulo).

CICHLIDAE

Geophagus steindachneri Eigenmann and Hildebrand

Seventeen, 20 to 93 mm., Honda, Nov. 1940.

Cichlasaurus kraussii (Steindachner)

Petenia kraussii Steindachner, Denks Akad Wiss. Wien, vol. 39, 1879, p. 28, pl. 2 (type locality, Rio Magdalena).

Five, 85 to 215 mm., Honda, Oct.-Nov. 1940.

NOTULAE NATURAE

NUMBER 159 OF NOVEMBER 2, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTIONS OF SEVEN NEW FRESH-WATER FISHES FROM PERU

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

In 1942 Dr. Wolfgang Weyrauch sent a collection of small Peruvian fresh-water fishes to the Academy. It comprises 66 specimens represented by 16 species, of which 7 are described as new. Nearly all belong to the Alto Amazonas drainage area of the eastern slope of Peru. Thanks are extended to Dr. Weyrauch for this donation to our museum and two of the new forms are dedicated to him.

OPHICHTHIDAE

Ophichthus pacifici Gunther. "Anguila".

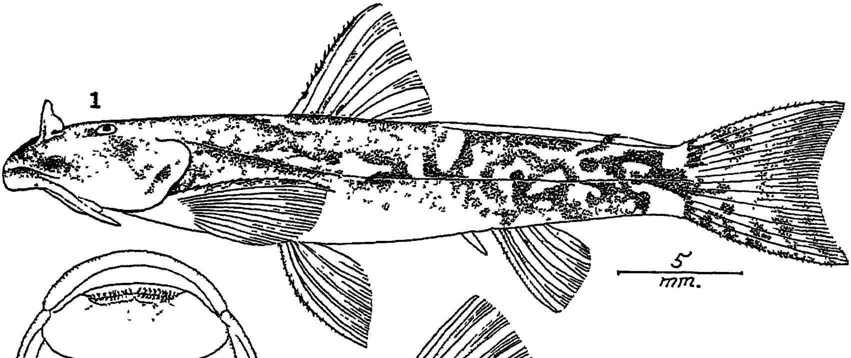
One, 250 mm., from Ancón near Lima, Pacific Slope.

CHARACIDAE

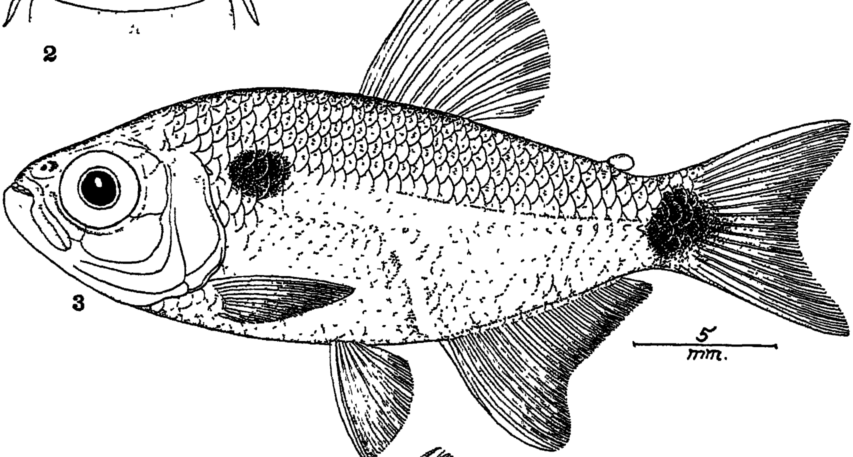
TETRAGONOPTERINAE

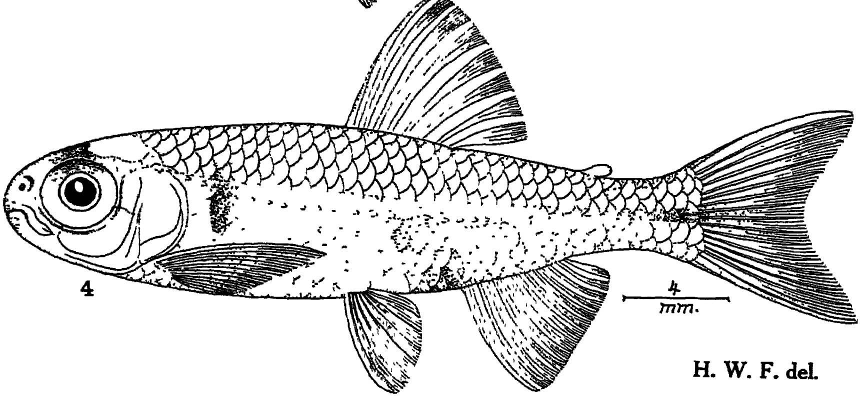
Hemigrammus megaceps new species Figure 3.

Depth 2⅔ to 2¾; head 2¾ to 3, width 1½ to 1⅘. Snout (in profile) 4¼ to 4⅘ in head as measured from snout tip, which is level with middle of eye; eye 2½ to 2¾, greatly exceeds snout or interorbital; maxillary reaches below first fifth in eye, length 2¼ to 2½ in head as measured from snout tip; mouth with short cleft and closed lower jaw protruding in front; upper teeth biserial, rows closely set and 5 each side in inner row; apparently no teeth on maxillary; 5 teeth each side in mandible, anterior large, last each side small; interorbital 2½ to 3 in head as measured from snout tip, low, convex; broad suborbitals largely cover cheek, though greater second with rather broad border of naked skin below and separating it all along preopercle ridge. Occipital extension short, bordered by 2½ scales each side. Very large, wide occipital fontanel begins in front of interorbital space and reaches into occipital extension. Gill opening wide, extends forward opposite front edge of eye. Gill rakers 7 + 12?, slenderly lanceolate, ½ length of gill filaments, which are ½ of eye.


1

2


3


4

H. W. F. del.

FIGURES 1 AND 2.—*Astroblepus formosus* new species.
FIGURE 3.—*Hemigrammus megaceps* new species.
FIGURE 4.—*Microgenys weyrauchi* new species.

Scales 34 or 35 in axial lateral series, of which 13 or 14 tubular, and all of others with notch on hind edge of scale exposure; 7 above to dorsal origin, 6 below to ventral origin, 12 predorsal. Caudal base scaly. Row of small low scales along base of anal fin. Pseudotympanum obscured by black humeral spot, subequal in length with eye.

D. ii, 8 or ii, 9, first branched ray 1 to $1\frac{1}{8}$ in total length of head; A. iii, 24 to iii, 26, first branched ray $1\frac{1}{2}$ to 2; adipose fin length $6\frac{1}{4}$ to $6\frac{1}{2}$; least depth of caudal peduncle $2\frac{2}{5}$ to 3; caudal fin 1 to $1\frac{1}{8}$, emarginate; pectoral $1\frac{2}{5}$ to $1\frac{1}{2}$, rays 11; ventral I, 7, fin $1\frac{3}{4}$ to $1\frac{4}{5}$ in total head length.

Color in alcohol with back pale olive brown, each scale exposure with a slightly darker transverse bar. Large black humeral blotch at second scale above lateral line, little greater than pupil in size but smaller than eye. Pale leaden gray axial streak, ill-defined, extends from humeral blotch to middle of large black basal caudal area, this also extended out over median caudal rays. Under surfaces all more or less silvery white, likewise iris. Dorsal and caudal grayish, other fins whitish.

A. N. S. P., no. 71624. Ninabamba near Ayacucho, at 1900 meters elevation, Rio Ucayali basin, Peru. Length 28 mm. Type.

A. N. S. P., nos. 71625 and 71626. Same data as type. Length 22 to 24 mm. Paratypes.

From the Peruvian species of the Amazon slope, *Hemigrammus schmardae* (Steindachner) and *Hemigrammus paipayensis* Pearson, the above species differs at once in the increased scales below the lateral line to the ventral origin, both of the known forms showing only 3. They also have fewer anal rays and a smaller head.

(*megaceps* large head.)

Microgenys weyrauchi new species Figure 4.

Depth 4; head $3\frac{2}{3}$, width 2. Snout (in profile) $4\frac{7}{8}$ in head, with obtuse front and level with lower edge of pupil; maxillary oblique, reaches below first fourth of eye, which last 3 in head; mouth small, closed jaws even in front; upper teeth biserial, with at least 4 each side in inner row; 2 or 3 large quindentate teeth on maxillary basally; mandible with row of 10 teeth, anterior largest; interorbital width $2\frac{2}{3}$ in head, low, convex; suborbitals cover cheek, second largest, in contact with preopercle ridge; rather narrow occipital fontanel begins in front of interorbital space and extends back into occipital extension. Gill rakers $6 + 8$?, lanceolate, shorter than gill filaments, which equal $\frac{1}{2}$ of eye.

Scales $30 + 2$ in lateral line; 5 above to dorsal origin, 4 below to ventral origin, 13 predorsal. Of fins caudal base alone scaly. Posterior scales of lateral line without distinct tubes. Pseudotympanum not evident.

D. ii, 7, first branched ray $1\frac{1}{10}$ in head; adipose fin 6; A. iii, 12, first branched ray $1\frac{1}{2}$; least depth of caudal peduncle $2\frac{3}{5}$; caudal fin $3\frac{1}{8}$ in rest of fish, emarginate behind; pectoral $1\frac{1}{10}$ in head, rays i, 12; ventral I, 8, fin $1\frac{3}{5}$ in head.

Color in alcohol pale olive buff. Sides of head and broad lateral band bright silvery white, with grayish longitudinal streak on caudal peduncle to caudal base, forming an ill-defined dark gray blotch on latter. Iris coppery, clouded with dark gray above. Gray transverse humeral bar at third scale of lateral line. Dorsal and caudal pale, grayish terminally. Other fins white.

A. N. S. P., no. 71627. Ninabamba near Ayacucho, at 1900 meters elevation, Rio Ucayali basin, Peru. Length 28 mm. Type.

Only the type obtained, representing a species related to *Microgenys lativirgatus* Pearson[1] but that species differing in its deeper body (depth 3¼ to 3⅓), smaller head (4¼), maxillary scarcely reaching below front rim of orbit, dorsal origin nearer tip of snout than caudal base by space equal to half length of head, ovoid humeral spot, broad median lateral band ending at caudal base in dark area of equal width and length, 56 to 71 mm.

(For Dr. Weyrauch who obtained the type.)

Hemibrycon huambonicus (Steindachner)

One, 45 mm. from Santa Ana River, at 1100 meters elevation, Urobamba, Peru, 1940.

Ceratobranchia obtusirostris Eigenmann

Five, 17 to 33 mm., San Ramón, Vallé de Chanchamayo, Peru, 1939.

LEBIASINAE

Lebiasina bimaculata Valenciennes. "Huaija".

One, 34 mm., January 1, 1939 and two, 25 to 82 mm., October 1, 1939, all from Lima.

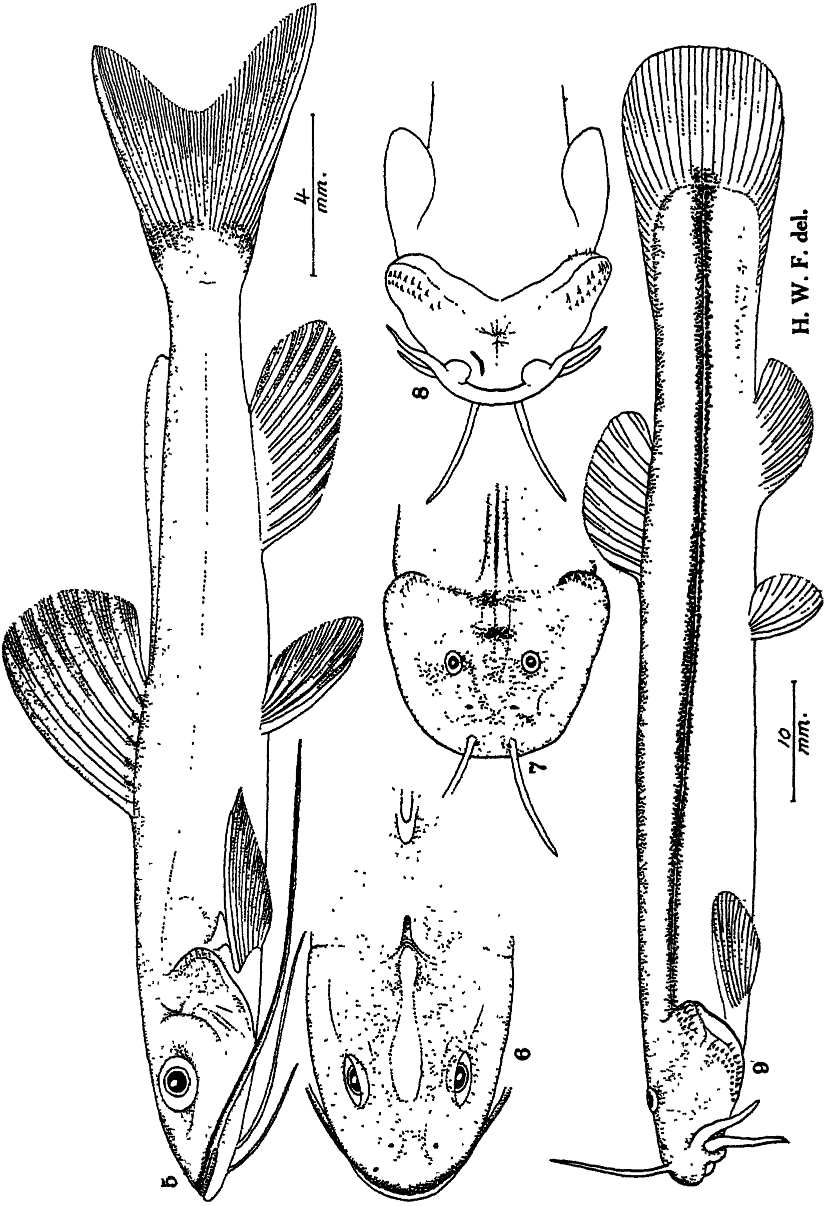
PIMELODIDAE

Cetopsorhamdia filamentosa new species Figures 5 and 6 (head above).

Depth 6⅞; head 3⅗, width 1⅙. Snout (in profile) 2⅘ in head as measured from snout tip, which forms in front below level of eye; eye 4⅓, 1½ in snout, 1⅔ in interorbital; mouth cleft rather large, extends little over half way to eye and closed mandible protrudes in front of snout; long maxillary barbel reaches into ventral base, outer mental barbel reaches basal part of pectoral and inner mental barbel reaches ⅔ to pectoral origin; teeth villiform, in rather narrow bands in each jaw, none on palate; interorbital 3⅛ in head measured from snout tip; long fontanel begins in front interorbital space and occupies most of short occipital extension, latter not forming bony

---

[1] In Eigenmann, Mem. Mus Comp. Zool., vol. 43, pt. 4, May 1927, p. 355 (type locality, Rio Pusoc, above Balsas, Peru).



Figures 5 and 6.—*Cetopsorhamdia filamentosa* new species.
Figures 7 to 9.—*Pygidium tenue* new species.

bridge to dorsal plate. Gill opening lateral, extends forward little before front of eye.

Skin everywhere smooth and tender. Top and sides of head entirely covered with smooth skin. Humeral extension reaches little over $\frac{1}{3}$ of depressed pectoral. Lateral line rather indistinct, though continuous.

D. I, 6, slender spine largely flexible, first ray $1\frac{1}{5}$ in total head length; long adipose fin low, length $3\frac{1}{2}$ in fish without caudal; A. I, 10, greatest height posteriorly or $1\frac{4}{5}$ in total head length; least depth of caudal peduncle $3\frac{7}{8}$; caudal well forked, upper lobe little shorter than lower which is contained $3\frac{1}{8}$ in rest of fish; pectoral I, 6, slender spine flexible, fin length $1\frac{1}{3}$ in total head length; ventral $1\frac{2}{3}$, with flexible spine and 5 rays.

Color in alcohol with back and upper surfaces grayish, darkest above and under surfaces all whitish. Lips dark gray to blackish gray and mental barbels white. Dorsal and caudal gray brown, former darker terminally and caudal with dark gray subbasally. Other fins all pale to whitish.

A. N. S. P., no. 71637. San Ramón, Vallé de Chanchamayo, at 800 meters elevation, Peru. 1939. Length 29 mm. Type.

Only the type specimen secured. It differs from the 2 Colombian species *Cetopsorhamdia nasus* Eigenmann and Fisher and *Cetopsorhamdia boquillae* Eigenmann, representing the subgenus *Cetopsorhamdia* Eigenmann and Fisher (type *Cetopsorhamdia nasus* Eigenmann and Fisher), in the long continuous median frontal fontanel, not divided into a separated frontal and occipital section by a bony bridge. It differs further in greatly longer barbels. It agrees with *Cetopsorhamdia* in the adnate orbital margin, the slender and flexible dorsal and pectoral spines, the skull covered with skin and the occipital bone obtuse and not extended.

(*filamentosus*, bearing filaments, with reference to the barbels.)

PYGIDIIDAE

Pygidium tenue new species Figures 7 (head above), 8 (head below) and 9.

Depth $8\frac{1}{3}$; head $5\frac{3}{7}$, length of head $1\frac{1}{4}$ in its width. Snout (in profile) $2\frac{1}{5}$ in head; eye $7\frac{1}{3}$, $3\frac{1}{8}$ in snout, $2\frac{1}{2}$ in interorbital, high and slightly entering upon profile of head; mouth cleft moderate, transverse, its width $2\frac{3}{4}$ in head; lower jaw well shorter than upper; lips smooth; moderate bands of villiform teeth in jaws, about 6 teeth transversely in each; nasal barbel $1\frac{2}{5}$ in head, upper maxillary barbel $2\frac{1}{2}$, lower maxillary barbel $2\frac{1}{10}$; interorbital width 3, low, level; opercle with cluster of small spines and interopercle with larger area of spines, latter larger, more numerous and in several series. Gill opening extends forward opposite middle of eye.

Skin smooth. No distinct lateral line. At each mouth corner, lower lip with flattened or disk-like lobe.

D. II, 8, second branched ray $2\frac{1}{3}$ in head, insertion or origin of fin midway between front of eye and hind edge of caudal; A. III, 7, second branched ray $2\frac{1}{6}$; least depth of caudal peduncle $1\frac{7}{8}$; caudal fin $1\frac{1}{4}$, convex behind; pectoral rays 8, all flexible and fin length $1\frac{3}{7}$; ventral fin $2\frac{1}{10}$, with 6 flexible rays.

Color in alcohol grayish brown, paler below to whitish along lower sides of head. Body with longitudinal gray black axial band. Some dark shades on head above and along back. Iris gray. Barbels all pale. Fins pale grayish, lower ones nearly whitish.

A. N. S. P., no. 71638. Acobamba, near Tarma at 2000 meters elevation, Rio Ucayali basin, Peru. July 1, 1942. Length 92 mm. Type.

Only the type secured, representing a species known by its very slender and elongated body, rather short maxillary barbels and with the coloration marked by a dark axial lateral band.

(*tenuis*, slender.)

Pygidium weyrauchi new species

Figures 10, 11 (head above) and 12 (head below).

Depth $6\frac{1}{2}$ to $6\frac{7}{8}$; head $4\frac{1}{4}$ to $4\frac{3}{4}$, width $1\frac{1}{10}$ to $1\frac{1}{8}$ in its length. Snout (in profile) $2\frac{1}{8}$ to $3\frac{1}{8}$ in head; eye 5 to $6\frac{1}{3}$, 2 in snout, $1\frac{4}{5}$ to 2 in interorbital, high and entering upper profile of head; mouth cleft moderate, transverse, width $2\frac{2}{3}$ to $2\frac{4}{5}$ in head; lower jaw low, well shorter than upper; lips smooth; minute teeth in bands in jaws; nasal barbel $1\frac{3}{7}$ to $1\frac{2}{3}$ in head; upper maxillary barbel $1\frac{1}{8}$ to $1\frac{1}{2}$, in type reaches pectoral origin, lower maxillary barbel $1\frac{3}{4}$ to 2; interorbital width $2\frac{2}{3}$ to 3 in head, low, level; opercle with cluster of moderately small spines and large cluster on interopercle, arranged in several irregular series. Gill opening extends forward opposite front of eye.

Skin smooth, without distinct lateral line.

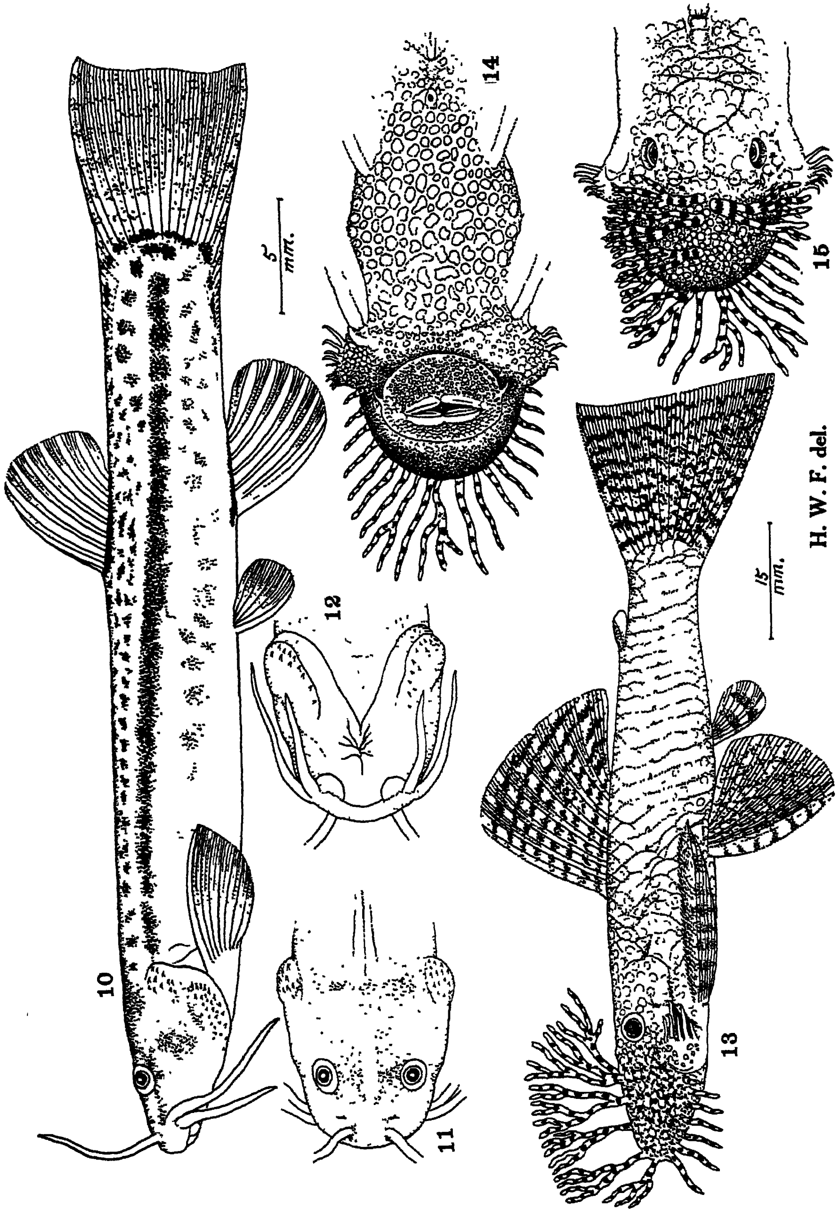
D. II, 7 or 8, second branched ray $1\frac{1}{2}$ to 2 in head, fin origin midway between front to hind eye edge and hind caudal edge; A. II, 6, first branched ray $1\frac{1}{2}$ to $1\frac{2}{3}$ in head; least depth of caudal peduncle $1\frac{2}{3}$ to 2; caudal fin $1\frac{1}{10}$ to $1\frac{1}{4}$, truncate behind; pectoral $1\frac{1}{5}$ to $1\frac{1}{2}$, rays 7; ventral 6, fin $2\frac{1}{4}$ to $2\frac{1}{2}$ in head.

Color in alcohol pale or light grayish to pale olive buff. A dark to gray black axial lateral band, made up of large undefined dark to blackish blotches and not extended on caudal base. Hind part of hypural with transverse dark line at bases of median caudal rays. Above and below dark lateral band on body are scattered dark gray variable spots and blotches. Dark grayish spots and shades on sides and upper part of head. Iris grayish. Barbels pale. Fins pale gray, lower ones whitish.

A. N. S. P., no. 71639. Acobamba, near Tarma at 2200 meters elevation, Rio Ucayali drainage, Peru. July 1, 1942. Length 49 mm. Type.

A. N. S. P., nos. 71640 to 71642. Same data as type. Length 25 to 48 mm. Paratypes.

In the absence of a prolonged upper pectoral ray these specimens approach *Pygidium oroyac* Eigenmann and Eigenmann, though with different



Figures 10 to 12.—*Pygidium weyrauchi* new species.
Figures 13 to 15.—*Ancistrus tamboensis* new species.

coloration, as the adult (90 mm. long) is figured without a dark lateral band, though traces are said to occur in the young. It differs further in that the maxillary barbels reach the pectoral origins. None are said to even reach the gill opening in *Pygidium oroyae*.

(Named for Dr. Weyrauch, who collected the types.)

Pygidium oroyae Eigenmann and Eigenmann

Twenty, 40 to 104 mm., Acobamba, 2900 meters elevation in a small brook, Jan. 11, 1942. They all agree with the figure published by Evermann and Radcliffe 1917 in the contrasted darker coloration of the back which is sharply set off from the pale or cream colored under surfaces, the line of demarcation low along the sides of the body. Although the smallest specimens have a definite dark axial lateral band it is not nearly so sharply defined as in *Pygidium weyrauchi*. All the specimens before me have dark barbels, whereas in both *Pygidium weyrauchi* and *P. tenue* they are pale or whitish. The figure published by Evermann and Radcliffe shows the barbels dark colored.

LORICARIIDAE

Ancistrus tamboensis new species Figures 13, 14 (head below) and 15 (head above).

Depth 5⅔; head 4, length 1⅓ in its width. Snout (in profile) 1¼ in head; eye 5, 4 in snout, 3 in interorbital; mouth width 2 in head; buccal disk width 1¼, with short lateral barbel each side and surfaces of both lips papillate; each dental plate with 25 to 30 short bifid teeth in either jaw; interorbital width 1⅔ in head, level. Gill opening subequal with, and largely below hind part of eye. Front edge of head with 22 slender tentacles, anterior longest and posterior shortest, or shortest last above spinescent interopercle. Down middle of front of head row of 4 more branched and more robust tentacles, mostly bifid and each terminal branch further forked; most posterior also with similar large branched tentacles at left of base. Interopercle with a cluster of 10 to 12 hooked spines, several of most posterior longest.

Scutes 24 + 2 in lateral series; 4 transversely between dorsal and ventral fins; 3 predorsal. Front ⅔ of head with smooth skin, more or less grooved irregularly and longitudinally. Entire under surface of head, breast and belly naked.

D. I, 7, spine slender, first ray subequal with head; adipose fin length 3 in head; A. I, 3, spine small and slender, first ray 2⅓ in head; least depth of caudal peduncle 2⅓; caudal length 2¾ in rest of fish, lower lobes longer; pectoral I, 8, fin 2⅓ in head; ventral I, 5, fin subequal with head.

Color in alcohol dull olive brown and below only buccal disk pale or creamy white. Head above and predorsal region especially variegated with pale to whitish spots, small and ill-defined, though numerous on soft anterior skin; large close set and better defined on bony predorsal area. All tentacles also dark brown, barred with whitish. Fins grayish, with waved blackish longitudinal bands on dorsal and transverse on caudal. Anal whitish, with 3 broad transverse blackish bands. Paired fins whitish, with transverse blackish bars.

A. N. S. P., no. 71643. Satipo, at 600 meters elevation in upper Tambo basin, Rio Ucayali drainage, Peru. 1942. Length 105 mm. Type.

Only the type obtained. It differs from *Ancistrus alga* (Cope), upon comparison with the cotypes of *Chaetostomus alga* in the Academy, chiefly in its coloration. In that species the dorsal and caudal are marked with white dots (with black and white bands in *A. tamboensis*), small white dots on top of head (large close set round white spots in *A. tamboensis*) and the tentacles simple or bifid (quadrifid in *A. tamboensis*, as each branch is again divided).

(Named for the Rio Tambo.)

ASTROBLEPIDAE

Astroblepus peruanus (Steindachner). "Bagre".

One, 45 mm., Acobamba, July 1, 1942.

Astroblepus supramollis Pearson. "Bagre".

One, 37 mm., Santa Ana, basin of Rio Urubamba at 1100 meters elevation, 1940.

Astroblepus labialis Pearson. "Bagre".

One, 34 mm., Huánuco at 1900 meters elevation, Rio Marañon basin, April 1, 1940.

Astroblepus formosus new species Figures 1 and 2 (mouth below).

Depth $5\frac{2}{5}$; head of $3\frac{3}{5}$, width equals its length. Snout (in profile) $1\frac{4}{5}$ in head; eye $8\frac{1}{2}$, $5\frac{1}{2}$ in snout, $2\frac{1}{4}$ in interorbital; mouth width $2\frac{2}{3}$ in head; buccal disk width $1\frac{1}{10}$, broad, lower lip only feebly and imperfectly papillate; barbel $2\frac{1}{5}$; 10 bifid teeth each side above and apparently fewer below; interorbital width 3 in head, low, flat. Gill opening lateral, length equals snout.

Skin smooth. Fin spines all with sparse and small points.

D. I, 4, flexible spine $1\frac{1}{4}$ in head; long low adipose fin with very small protruding spine; A. I, 4, spine $1\frac{3}{4}$ in head; least depth of caudal peduncle $2\frac{7}{8}$; caudal fin $1\frac{1}{10}$, emarginate; pectoral $1\frac{1}{8}$, rays 11; ventral I, 4, spine flexible, fin $1\frac{2}{7}$ in head. Anal papilla long, $5\frac{2}{3}$ in head.

Color in alcohol with back light creamy brown and under surfaces all whitish. Body with an elaborate design of curved or arched irregular blackish brown bands. Head with some dark brown to blackish brown areas. Barbels whitish. Iris gray. Fins largely pale to whitish. Several dark gray bands on spine and front rays of dorsal. Caudal with 4 or 5 irregular dark transverse bands, more or less broken as dark blotches and most distinct on upper and lower edges of fin.

A. N. S. P., no. 71647. Acobamba, near Tarma at 2900 meters elevation, Rio Ucayali basin, Peru. July 1, 1942. Length 35 mm. Type.

A. N. S. P., nos. 71650 to 71669. Same locality as type. January 11, 1942. Length 30 to 44 mm. Paratypes. Most of these in poor state of preservation. They show great extremes of variation in color markings. Not only are no 2 specimens alike, but also the markings vary equally on the 2 sides of the same fish.

Apparently the species is related to the Ecuadorean *Astroblepus whymperi* (Boulenger), *A. eigenmanni* (Regan) and *A. vaillanti* (Regan), but differs from all in the pleasing contrasted coloration, proportions of fins and other structural characters.

(*formosus* handsome.)

SYNBRANCHIDAE

Synbranchus marmoratus Bloch. "Anguila".

One, 180 mm., Satipo, upper Tambo basin, Rio Ucayali drainage.

NOTULAE NATURAE

NUMBER 160 OF DECEMBER 28, 1945

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON A CRETACEOUS FRESH-WATER GASTROPOD FROM SOUTHWESTERN UTAH

BY TENG-CHIEN YEN

Research Fellow, Department of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia [1]

This collection was made by Mr. H. J. Bissell, of the U. S. Geological Survey, from a locality about a quarter of a mile east of Vermillion Castle camp ground, Parowan Canyon, Iron County, Utah. The deposit was provisionally assigned to the upper Kaiparowits formation, which is generally considered to be of late Upper Cretaceous age.

The specimens are contained in rather soft sandstone of dark grayish color, and the matrix is comparatively easy to remove in the course of preparation. However, most of the specimens are badly distorted and none of them is perfectly preserved. A number of the better preserved examples are herein described as a new genus and species, probably in the family Ampullariidae.

MESOLANISTES new genus

Shell sinistral, imperforate, of large size, ovately globose in outline, with moderately elevated spire and inflated body whorl. Whorls few, separated by incised, but not deeply impressed, suture and marked by strong growth lines. Aperture of subovate form; outer lip thin and simple; inner lip strongly thickened and somewhat truncate at columella.

Genotype.—*Mesolanistes cretaceus* new species.

---

[1] And Research Geologist supported by the Penrose Fund of the Geological Society of America.

Some of the features in this genus remind one of *Lanistes* Montfort, which has been reported from Early Tertiary to Recent times; however, it differs by its imperforate shell and strongly thickened inner lip. It differs from *Leroya* Grandidier, described in the Recent fauna of east and central Africa, by lack of spiral sculpture and by having a simple and thin outer lip.

Mesolanistes cretaceus new species Figs. 1-4.

Shell sinistral, imperforate, of large size and ovately globose in outline. The spire is low and small in comparison with the transversely inflated body whorl. Whorls 3 to 4, very rapidly increasing in size, separated by an incised, but not deeply impressed, suture. Exposed surface of early whorls is scarcely convex, the last one roundly convex. Sculpture consists of distinct lines of growth, which are costulate near the suture, but they are less conspicuous along and below the peripheral surface of the whorl. Aperture more or less ovate in outline and descending; outer lip thin and showing a tendency to expansion; inner lip strongly thickened, with its parietal margin more or less spreading and columella slightly truncated.

Because of their distorted state of preservation, measurements of these specimens are not given, but two specimens are illustrated in natural size.

Figured specimens.—Holotype, U. S. Nat. Mus. 103868, paratypes, U. S. Nat. Mus. 103869. Unfigured paratypes, U. S. Nat. Mus. 103870. Unfigured paratypes, A. N. S. P. 16736.

This interesting form appears to have the general outline and size of "*Physa*" *lacteana* Russell, which was described from the middle of the upper Milk River beds in southern Alberta, Canada.[2] I have not seen the type of that species, and its generic position may need further consideration. It may prove to belong to the genus *Mesolanistes*. However, the wide separation in geographic range, in addition to such observable shell features as costulate sculpture and strongly thickened parietal and columellar margins, may well distinguish *Mesolanistes cretaceus* from the Canadian species.

---

[2] Russell, L. S., Fauna of the upper Milk River beds, southern Alberta. Trans. Royal Soc. Canada, 3d ser., sec. 4, vol. 29, p. 119, pl. 1, fig. 7, 1935.

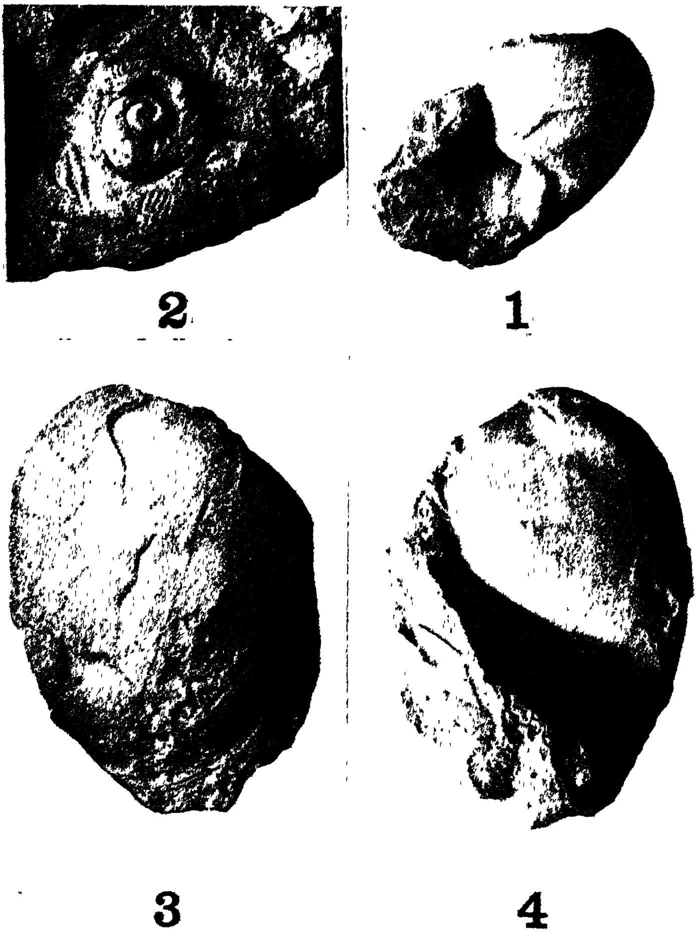


Fig. 1.—Apertural view of the holotype. (Natural size.) Fig. 2.—Apical view of a paratype. (× 2.) Fig. 3—Back view of a paratype of larger size, showing the outer lip margin. (Natural size.) Fig. 4.—Apertural view of the same specimen. (Natural size.)

NOTULAE NATURAE

NUMBER 161 OF JANUARY 16, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

COLOMBIAN ZOOLOGICAL SURVEY. PART II.*—NOTES ON COLOMBIAN CROWS, WRENS AND SWALLOWS

BY RODOLPHE MEYER DE SCHAUENSEE

Curator of Birds, The Academy of Natural Sciences of Philadelphia

This paper contains notes on species of birds belonging to the groups enumerated in the title. In it are described two new subspecies of wrens, and the rediscovery of *Atticora flavipes* (Chapman) is recorded. The latter has made necessary a critical study of the forms of *Atticora cyanoleuca,* which is also here recorded.

The field work carried out in Colombia for the Academy by Mr. von Sneidern has been supported by a grant from the American Philosophical Society, and by Mr. Charles M. B. Cadwalader and the author.

CORVIDAE

Cyanocorax affinis affinis Pelzeln

As already pointed out by Hellmayr, birds from northwestern Colombia (specimens from Juradó and Rio Salaquí examined) are yellowish below and close to *zeledoni* of Panama. Curiously, specimens from farther south (Alto del Buey, Rio Jurubidá) revert to the white-bellied type found in the Eastern and Central Andes and Santa Marta.

---

* The following papers, previously published by the Academy, belong in this series although not numbered as parts of the same:

BOND, J. AND R. M. DE SCHAUENSEE.—On some Birds from southern Colombia, Proc. A.N.S.P., vol. 92, pp. 153-169, 1940.

DE SCHAUENSEE, R. M.—A new *Muscisaxicola* from Colombia, Not. Nat., no. 98, 1943; A new Species of Dove of the genus *Leptotila* from Colombia, Not. Nat., no. 122, 1943; Notes on Colombian Parrots, Not. Nat., no. 140, 1944; Notes on Colombian Woodpeckers, with the description of a new Form, Not. Nat., no. 141, 1944; Notes on Colombian Birds, with a description of a new Form of *Zenaida,* Not. Nat., no. 144, 1944; Notes on Colombian Antbirds, Ovenbirds and Woodhewers, with a description of a new Form from Peru, Not. Nat., no. 153, 1945; Notes on *Buteo magnirostris,* with a description of a new Form from Peru, Not. Nat., no. 156, 1945; Notes on Colombian Birds, Proc. A.N.S.P., vol. 97, pp. 1-16, 1945; Notes on Colombian Flycatchers, Manakins and Cotingas, Proc. A.N.S.P., vol. 97, pp. 41-57, 1945.

FOWLER, H. W.—Fresh-water Fishes from northwestern Colombia, Proc. A.N.S.P., vol. 96, pp. 227-248, 1944.

Measurements of the birds examined are not very conclusive due to the lack of sufficient East Andean material, but East Andean birds available appear to be larger than specimens from other parts of Colombia. Their wings measure as follows: *C. a. affinis;* "Bogotá", ♂, 176, 180 mm.; Santa Marta, ♂, 167, 169, ♀, 170, 172.5; Rio Juradó, Rio Salaquí, ♂, 172, 172, ♀, 162, 168; Rio Jurubidá, Alto del Buey, ♂, 161, 167, 168 (worn); *zeledoni;* Canal Zone, ♂, 165, ♀, 163.5.

Cyanolyca pulchra pulchra Lawrence

Since Bond and de Schauensee (Proc. Acad. Nat. Sci. Phila., XCII, 1940, p. 165) recorded a specimen of this rare jay from the Rio Munchique, another has come to hand. It is a female from Ricaurte, Nariño, and presents certain differences from the more northern specimen. These are apparently due to immaturity, as the bird is not altogether adult. The fore-crown is silvery blue with no purplish tinge, gradually shading into a brighter azure-blue nuchal collar. In the Rio Munchique bird the crown is silvery violet-blue, changing rather abruptly on the hind crown into deeper violet-blue. The tail in the Ricaurte bird is paler blue than in our other specimen, and the under surface and throat patch are also bluer.

Recently, at the United States National Museum in Washington, Mr. Herbert Deignan showed me a specimen of this jay which had been recently presented to that institution by the Coleman Museum of Georgetown University. It was collected by Söderstrom in Ecuador and given by him to Woodstock College, Woodstock, Md., which presented it to the Coleman Museum.

The measurements of the three specimens are as follows: Ricaurte, ♀, wing 125 mm.; tail 129, culmen (from anterior edge of nostril) 20. Rio Munchique, ♀, wing 122 mm., tail 123, culmen (from anterior edge of nostril) 19. Ecuador (Söderstrom specimen, now in United States National Museum) sex indet., wing 127 mm., tail 131, culmen (from anterior edge of nostril) 21.

TROGLODYTIDAE

Cistothorus platensis tolimae new subspecies

TYPE.—♂ ad., A.N.S.P. no. 154966, collected on the Nevado de Tolima (12,000 ft.), Central Andes of Colombia, by Kjell von Sneidern on May 5, 1942.

Description.—Differs from *C. p. aequatorialis* Lawrence by larger size, less rufescent upper parts, and on the average duller, less rufescent sides of neck and sides of body.

Measurements of type.—Wing 52.5 mm., tail 46, culmen 11.

Additional measurements.—2 ♂, 51 mm, 51.5, 2 ♀, 48, 48.5 (Nevado de Tolima, 12,000 ft.).

Remarks.—The wings of four males from Mt. Pichincha measure 47, 47, 47.5, 48 mm., one no sex 48, two females 47, 48.5.

Five birds from Mayasquer, (8400 ft.), Chiles (11,000 ft.), Cumbal (11,400 ft.) and Coconuco (10,000 ft.) are similar to Ecuador birds in size, but duller in color; in other words, intermediate between the two forms. Their wings measure: ♂, 48, 48.5, ♀, 47, 47.5 mm. A male from Coconuco is also referable to *aequatorialis.* Its wing measures 47 mm.

Dr. Hellmayr calls attention to the slightly larger size of Central Andean birds, and to their color. He examined specimens from the Valle de las Pappas and Santa Isabel. The former are undoubtedly intermediate, while the latter should be typical of *tolimae.* We also have a single specimen of *platensis* from Munchique, Western Andes, but unfortunately it is not fully adult. It is very much duller than young birds from Pichincha and has a wing of 45 mm. I have not seen specimens of *tamae* Cory from the Eastern Andes but these birds are described as more rufescent throughout than *aequatorialis.* Birds from Santa Marta (*alticola* Salvin and Goodman, 8 specimens examined) are smaller, duller, and have the streaks on the mantle white instead of buff.

Heleodytes turdinus hypostictus (Gould)

Twenty-two specimens from La Morelia differ slightly from nine birds from Puerto Indiana, Rio Suno, Rio Curaray, Rio Huallaga and Moyobamba by averaging slightly darker above, and by the bellies being of a darker, more soiled color.

In such a variable bird these differences should not be recognized by name, as in the Morelia series there are several birds which could not possibly be distinguished from Ecuadorian and Peruvian examples.

With this added material at hand, both Bond and I[1] would now recognize *H. t. chanchamayoensis* Carriker as a distinct form characterized by averaging more lightly spotted below and by having the upper parts paler and inclined to barring. In addition, two young birds are very different from birds of approximately the same age of *hypostictus,* for they are very white below and virtually unspotted.

---

[1] Proc. Acad. Nat. Sci. Phila., 94, 1941, p. 360.

Rusby's specimen in the American Museum of Natural History said to have come from the Rio Beni, Bolivia resembles *hypostictus* in coloration.

Carriker's specimens of *chanchamayoensis* were all taken at 4000 ft. and perhaps they represent a highland form of this widespread species. Von Seilern had specimens which apparently agreed with Carriker's description of *chanchamayoensis* from Yahuarmayo, southeastern Peru (Ann. Naturh. Mus., Wien, 47, 1936, p. 33).

Thryothorus leucotis galbraithii Lawrence

Three Soatatá specimens agree with seven examples from the Canal Zone and Garachiné, Darien.' They are not more heavily barred above than Panamanian birds, as was a single example recorded by Hellmayr from the Rio Salaquí. As supposed by him, this difference was apparently an individual one. Griscom has recorded a single example from Permé as *leucotis* but it may have been an abnormally pale-bellied bird.

Birds from Turbaco, Jaraquiel, Puerto Zapote, Cartagena, Dept. of Bolivar, all agree in being paler than the Soatatá birds, resembling closely *venezuelensis* in this respect. A single example from Gamarra on the Magdalena, which should be typical of *leucotis*, is brighter below, more like *galbraithii*. It agrees with the Bolivar birds, however, in the color of the upper surface. Birds from the arid littoral of northern Colombia appear intermediate between *leucotis* and *venezuelensis*.

In the coloration of the upper parts our ten specimens of *galbraithii*, irrespective of locality, are very variable, some being decidedly grayish brown, others with a strong rufescent tinge. The difference is not caused by wear.

Thryothorus leucopogon leucopogon (Salvadori and Festa)

We have eight specimens from the lower slopes of the Baudó Mts. and the Rio Jurubidá, all of which agree well with each other.

Six birds from farther north, Murindó, Rio Salaquí and Rio Juradó appear unstable in color. Four resemble the Baudó series, but two, (Rio Juradó and Salaquí) are much grayer than the rest, thus resembling Griscom's *grisescens* (Bull. Mus. Comp. Zool., 72, no. 9, 1932, p. 359; Permé, Darien). This area is probably where the two forms meet.

Thryothorus nigricapillus schottii (Baird)

Examination of large series of *schottii*, *connectens* and *nigricapillus* has revealed some interesting facts. The characters of the race *schottii* find their maximum development near the headwaters of the Atrato. In this region the lower parts are closely barred with black with the throat either barred or spotted with black.

Birds from northwest Colombia, Rio Juradó and Punta Ardita, although virtually topotypes (type from the Truando), have whiter throats. In seven specimens, only one has the throat barred, one slightly barred, three lightly spotted and two immaculate. They are indistinguishable from two specimens of *redivivus* Griscom (topotypes from Permé). All these northern birds are very close to Chapman's *connectens*.

I have examined 26 specimens of *schottii* (7 of them from northwestern Colombia, the rest from the upper Atrato), 25 *connectens* from Rio Munchique, La Costa, and Ricaurte, and 11 *nigricapillus* from Bucay, and come to the following conclusions:

T. n. schottii is found from Darien southward to the headwaters of the Atrato, the characters of which are most developed in upper Atrato birds. *Redivivus* is a synonym, and resembles birds from the northwestern part of the range.

T. n. connectens ranges from about 3° N. on the Pacific coast of Colombia, south at least to the boundary of Ecuador. This is a form much resembling the northern extreme of *schottii* but with a whiter throat and, on the average, more lightly barred chest. As its name implies, it is exactly intermediate between this and the next race.

T. n. nigricapillus, western Ecuador. Easily distinguishable from the preceding two races by having the center of the chest immaculate white or very faintly barred.

Thryothorus spadix spadix (Bangs)

An immature bird (questionably sexed as a male) differs from adults by having the entire body plumage duller and darker, the lores, auriculars and throat grayish brown, the pileum dull brown.

This form presents such striking differences from *atrigularis* (i.e. barred tail, grayish black pileum, throat only, black), that I prefer to keep it distinct. Our five specimens are from La Costa, Rio Munchique and Rio Mechengue.

Thryothorus fasciato-ventris albogularis Sclater

Specimens from the Rio Juradó, Rio Salaquí, Murindó and Andagoya, belong to this slightly marked form. They have dark auriculars, thus resembling Panama birds. The race is new to Colombia.

Thryothorus mystacalis amaurogaster Chapman

Four birds from La Candela and San Agustín are very close to five *amaurogaster*. They are a trifle darker on the crown and back but are best included in that race. Two birds from Toché are intermediate between this race and *saltuensis* (ten specimens examined). The latter is easily separable by its purer gray head and nape and less strongly rufescent flanks. The color of the flanks is similar to typical *mystacalis* but the breast, head and nape are purer gray. Of the latter I have seen four specimens.

Thryothorus euophrys euophrys Sclater

A new record for Colombia. Eight specimens were collected at Mayasquer (7500-8400 ft.). They agree with four western Ecuador examples from Pichincha and Santo Domingo.

Leucolepis phaeocephala lawrencii (Lawrence)

Two males and a female from Soatatá, at the mouth of the Atrato, agree closely with Panama birds. Thus *lawrencii* must occupy a very restricted zone in Colombia, on the west bank of the mouth of the Atrato.

Leucolepis phaeocephala chocoana new subspecies

TYPE.—♂ ad., A.N.S.P. 146322, collected on the Alto del Buey, Baudó Mts., above the Rio Baudó (3000 ft.), Chocó, western Colombia, on June 28, 1940, by Kjell von Sneidern.

Description.—Differs from *L. p. phaeocephala* (Sclater) by being much darker both above and below, the chest not conspicuously different from the belly, the crown blackish, and by having the chin and malar region more conspicuously black.

Measurements of type.—Wing 65.5 mm., tail 31, culmen 20.5, tarsus 25.

Range.—The Baudó Mountains, Chocó, Colombia.

Remarks.—Specimens from Juradó are lighter in color than Baudó birds, thus reverting more to style of coloration found in the typical form. This anomaly in distribution may be explained by the northern birds forming the transition between the very dark *chocoana* and the pale *lawrencii.*

This parallels the case of *Thryothorus nigricapillus* on the west coast of Colombia, in which *schottii* achieves its maximum characters at the head of the Atrato, while further north it closely resembles *connectens* Chapman of Nariño (see p. 5).

Material examined.—*L. p. phaeocephala,* ♂, 3 ♀, Esmeraldas, Bucay, western Ecuador. *L. p. chocoana,* 3 ♂, ♀ Alto del Buey, Nuquí. *L. p. chocoana* > *lawrencii,* 2 ♂, 3 ♀, Juradó, Murindó, Rio Jampavadó. *L. p. lawrencii,* 2 ♂, ♀, o, Soatatá, ♂, ♀, Gatún, Canal Zone. *L. p. brunnescens,* 3 ♂, 2 ♀, La Vijagua, Costa Rica.

Henicorhina leucosticta darienensis Hellmayr

This form ranges southward in Colombia to the Baudó Mountains from which range we have a series of ten birds from above Nuqui (3000-3400 ft.). The latter differ very slightly from Darien and Juradó birds in averaging smaller and darker. Just to the south of them, in the Rio San Juan drainage, the brown-headed *inornata* is found, of which we have specimens from Cordoba and La Costa. Baudó birds show no approach to them.

To the east on the west slope of the West Andes the brown-crowned *eucharis* is found in the subtropical zone. Baudó birds show no approach to this form either.

Henicorhina leucophrys brunneiceps Chapman

A series of 17 birds from Rio Munchique (3000 ft.), Rio Mechengue (2400 ft.), La Costa (3000 ft.), Ricaurte (3900 ft.) and Mayasquer (4500-4800 ft.) are easily separable by their bright upper parts from 41 specimens from Munchique (6000-7200 ft.), San Antonio (6000-7500 ft.), Mayasquer (7800 ft.), Western Andes; Toché (7000 ft.), La Candela (5800 ft.), Buenavista, Huila (7000 ft.), Laguneta (9000 ft.), Central Andes; La Palmita, La Pica, Cachirí, Pueblo Nuevo and Choachí, in the subtropical zone of the East Andes, all of which belong to the typical form.

A very interesting and unfortunately single specimen comes from the headwaters of the Atrato (3000 ft.). It differs from *brunneiceps* by darker coloration of the upper-surface, paler more silvery gray chest and throat, and smaller size. *H. leucophrys brunneiceps* in western Colombia ranges northward not quite to the Rio San Juan. The upper Atrato drainage, I feel convinced, is inhabited by a different form which should await more material before being differentiated.

HIRUNDINIDAE

The receipt of two specimens of the virtually unknown *Atticora* (*Pygochelidon* auct.) *flavipes* (Chapman) has led to the study of 126 specimens of *Atticora cyanoleuca* and its races, *patagonica* and *peruviana*, in an endeavor to clarify the status of *flavipes*. The results are incorporated in the following pages.

Atticora flavipes (Chapman)

It was with considerable surprise that two skins of this swallow were received from Colombia.

The species heretofore has been known from a single specimen collected at Maraynioc, Peru (10,850 ft.), by Watkins in 1921, and described by

Chapman the following year (Amer. Mus. Novit., no. 30, p. 8, 1922). Up to the time Hellmayr published on the swallows in his " Birds of the Americas " (1935) no more specimens came to hand and Hellmayr relegated it to the synonymy of *Atticora c. cyanoleuca* (Vieillot), saying, " I cannot help thinking that *flavipes* was based on a juvenile individual of the present form (*cyanoleuca*) . . .".

The two specimens of *flavipes* before me prove definitely that this is not the case, but show that *flavipes* is a perfectly good species, occurring together with *cyanoleuca*, at the upper limits of its range in the subtropical zone, and above it, in the temperate zone. Whether the breeding range of the two overlap is not known.

From *cyanoleuca* it is easily separable by the dark blue, and not very shiny upper surface (rather close to that of *Atticora fasciata*), the dusky sides to the body, and the solid cinnamon throat and chest, pale feet and smaller bill.

In the immature stage *Atticora cyanoleuca* has a pinkish buff chest, but the throat is dirty white, only tinged with buffy, the flanks are not blackish, and in skins the feet are paler than in the adults but apparently in life are " gray ", " black ", " blackish ", or " brown ", according to notes made by Carriker and von Sneidern. The feet of our two *flavipes* are noted by von Sneidern as " whitish " and " whitish-pink ".

The two specimens were collected at Laguneta, Caldas, (10,000 ft.), April 8, and Toché, Tolima (7300 ft.), May 1. At Laguneta (7000-9000 ft.) *Atticora c. cyanoleuca* was common, and Chapman's collectors secured it also at Toché, showing the two species occur together in Colombia, both inhabiting forested country.

Mr. Zimmer of the American Museum of Natural History has been kind enough to compare one of our specimens with the type of *Atticora flavipes*, and under the date of July 10, 1945 writes me as follows: " There is almost perfect agreement between this bird and the type. Your specimen is little more deeply colored on the throat, and has the upper parts more glossy. However, the type is a female, and your bird is a male, so the differences are just what one would expect between sexes. The Colombian record is most interesting and refutes any suggestion that the species is not perfectly distinct ".

Measurements of the two specimens are as follows: Wing, ♂ 95 mm.; tail 49; depth of fork 14; culmen 4.5; ♀, wing 91; tail 46.5; depth of fork 13; culmen 4.5.

Atticora cyanoleuca cyanoleuca (Vieillot)

In Colombia this is a common swallow found from 2000-10,000 ft., although these are probably not the extreme limits, for in Ecuador it is known from sea-level to 10,500 ft. Its range comprises a vast portion of South America, usually where there are mountains, excluding the coast of Peru and southern South America, but its status is complicated by the invasion of the southern *patagonica* into its range during the antarctic winter. From Ecuador we have specimens of *cyanoleuca* marked as breeding in May, and specimens with enlarged gonads taken in February. In Trinidad it has been found nesting at Diego Martin, near Port of Spain, on March 31, 1922 (Belcher and Smooker, Ibis, 1937, p. 506). Hartert reports full-grown nestlings from western Ecuador May 18 (Novit. Zool., V, 1898, p. 480).

Far from any mountains is one bird recorded from the Amazon delta (Benevides, Griscom and Greenway, Bull. Mus. Comp. Zool., 88, p. 298, 1941).

The differences between the two forms are given under the following heading.

Atticora cyanoleuca patagonica (D'Orbigny and Lafresnaye)

A single specimen of this form was taken at Salento (5000 ft.) on July 10. It is an immature female and clearly referable to the southern race. I know of no previous Colombian record, excepting a rather indefinite one of Hartert and Venturi. They say "Un individu adulte de Colombie (de la preparation dite de Bogotá) est un peu intermediaire entre les deux formes, mais se raproche davantage de la forme meridionale (*A. patagonica*)." (Novit. Zool. XVI, 1909, p. 169).

The differences between immature specimens of the two forms are greater than in adults, as Chapman has already pointed out (Amer. Mus. Novit., 1922, no. 30). The immature of *patagonica* can easily be distinguished from that of *cyanoleuca* by having the wash on the breast sandy-colored, rather than buffy. Of 20 immature *patagonica* examined, only two have buffy chest bands (Oploca and Callipampa, Bolivia), while in 25 immature *cyanoleuca* none has a sandy-colored band across the chest, but all have it buffy. Sharpe and Wyatt's plate (Mon. Hirund., vol. 2) shows an immature specimen of *cyanoleuca* but the chin and throat are much too strongly pinkish. The other characters which serve to distinguish adults hold good also in the immature of both forms. In *patagonica* the under wing-coverts are light, the shorter under tail-coverts are white, the longer one mouse color (in adults the longer ones are black) and the outer tail feathers are very narrowly margined with white on the outer web.

In immature specimens of *cyanoleuca* the under wing-coverts are dark, the under tail-coverts are all mouse color, and the outer tail feathers virtually never margined with white. (In 62 specimens examined one adult from Guayabo, Costa Rica has a narrow white margin.) Further, in adults of *cyanoleuca* the nape feathers are basally white, while in *patagonica* they are gray. In *cyanoleuca* the under tail-coverts are black, while in *patagonica* only the longer ones are. Measurements overlap to such an extent that size alone cannot be relied upon as a distinguishing character.

Wing measurements.—The wings of 45 specimens of *patagonica* measure (in millimeters) as follows; 91, 92, 93.5 (4), 94.5, 95 (4), 96, 97, 98 (2), 98.5 (2), 99.5, 100 (4), 101 (3), 102 (4), 102.5 (2), 103 (5), 104 (3), 104 (3), 104.5 (2), 105 (3), 105.5. Average 99.7 mm.

The wings of 62 specimens of *cyanoleuca* measure (in millimeters) as follows: 88, 89.5, 90 (3), 91, 91.5, 92 (2), 92.5, 93, 93.5, 94 (9), 94.5 (5), 95 (2), 95.5 (5), 96 (2), 96.5 (3), 97 (7), 97.5 (3), 98 (3), 98.5, 99 (4), 100 (2), 101, 102. Average 95.3 mm. The bills and tails of *cyanoleuca* average smaller than in *patagonica*, but, as in the wing measurements, there is also much overlap.

Atticora cyanoleuca peruviana (Chapman)

This form, as represented by 9 specimens from Cartavia (sea level), Nazca, Pisco, Huarmey and Arequipa (7000 ft.), all on the west coast of Peru, combines the characters of *patagonica* and *cyanoleuca.* They have light under wing-coverts, even lighter than *patagonica,* and the dark under tail coverts of *cyanoleuca.* In having the outermost rectrix edged with white and the nape feathers gray (8 specimens out of 9), they show that they are closer to the southern form.

Five specimens from the juncture of the Chanchan and Chiguancay rivers, western Ecuador, while closest to *cyanoleuca,* show an approach to *peruviana* in having the under wing-coverts paler than in birds from other regions typical of *cyanoleuca.* An immature specimen from Palambla, Piura, shows the pinkish buff breast band of *cyanoleuca* but has the under wing-coverts intermediate as in birds from the Chanchan-Chiguancay juncture.

The size of *peruviana* is not smaller than that of *patagonica* but shows great variation as might be expected in an intermediate form, in fact the smallest and largest birds measured belong to *peruviana.* The wings of nine specimens measure 88, 94, 97 (2), 97.5, 98, 102, 105, 106 mm.; average 98.4. The average falls between *patagonica* (99.7 mm.) and *cyanoleuca* (95.3 mm.). Size is not correlated with altitude.

Localities and dates at which *cyanoleuca*, *patagonica* and *peruviana* have been found follow.

cyanoleuca

January.—Roraima, British Guiana (10);[2] São Sebastian, San Paolo, Brazil (10); El Tambo, Colombia (22).

February.—Near Lazcano, Uruguay (5-8);[3] Gaunabal, Costa Rica (15, 20); Huigra, Ecuador (17, 22); Rio Perlasiví, Colombia (21); Incachaca, Bolivia (24); Junction of the Chanchan-Chiguancay Rivers, Ecuador (28).

March.—Laguneta, Colombia (3, 31); Guayabos, Costa Rica (3, 18); El Tambo, Colombia (12); Junction Chanchan-Chiguancay, Ecuador (12); Incachaca, Bolivia (19); Diego Martin, Trinidad (22)[4] breeding; Ricaurte, Colombia (26, 28, 29, 31).

April.—La Concepcion, Colombia (6); Colonia Tovar, Venezuela (8); Laguneta Colombia (11, 12, 18, 30); Tafi trail, Prov. Tucumán, Argentina (12).[5]

May.—Hacienda Garzon, Ecuador (11 breeding); Navarro, Costa Rica (17); Incachaca, Bolivia (28).

July.—Petare, Venezuela (22).

August.—San Agustín, Colombia (12); El Tambo, Colombia (16); La Candela, Colombia (22).

October.—Ipiranga, S. Paulo, Brazil (-).

December.—Huacapistana, Peru (10, 11, 13); Curitiba, Brazil (26).

patagonica

January.—Gregory Bay, Str. of Magellan (18, 19); Elizabeth I., Str. of Magellan (20); Est. San Martino Monte, Argentina (no date).

February.—Tilcara, Jujuy, Argentina (8, 12);[5] Los Yngleses, Ajó, Argentina (20); Oploca, Bolivia (25).

March.—Calama, Antofogasta, Chili (1); Guamin, Buenos Ayres, Argentina (5, 7); San Pablo, Tucumán, Argentina (12); Callipampa, Bolivia (14); Petrerillo, Mendoza, Argentina (19); Chilecito, Entre Rios, Argentina (27).

April.—Yurimaguas, Peru (16);[5] Nauta, Peru (22-26).[5]

May.—Camacusa, British Guiana (2).

---

[2] Figures denote day of month.

[3] Wetmore, Bull. U. S. Nat. Mus., no. 133, p. 343, 1926.

[4] Belcher and Smooker, Ibis, 1937, p. 506.

[5] Chapman, Amer. Mus. Novit., no. 30, 1922, p. 11.

June.—La Gaira, Venezuela (2).

July.—Gatún, Panama (7,16); Salento, Colombia (10); Trinidad (28); Petare, Venezuela (30).

August.—Trinidad (5, 26); Estancia La Germania, Santa Fé, Argentina (6).[6] Annai, British Guiana (11); Chiñiri, Bolivia (28); Descalvados, Matto Grosso, Brazil (31).

September.—Santa Elena, Entre Rios, Argentina (15); [7] Fortín Campero, Bolivia (18); Barracas al Sud, Buenos Aires, Argentina (21); 200 miles west of Puerto Piñasco, Paraguay (24,28); Uruguay (no date).

October.—Cosnipata, Peru (17) [5]; Conchitas, Buenos Aires, Argentina (no date).

November.—Paso Limay, Neuquen, Argentina (11); Santa Elena, Uruguay (18); General Roca, Rio Negro, Argentina (27).

December.—Neuquen, Argentina (8); Carhué, Buenos Aires, Argentina (18).

peruviana

February.—Pisco, Peru (28); Huarmey, Peru (29).

March.—Nazca, Peru (28).

April.—Arequipa, Peru (14).

May.—Cartavia, Peru (21).

December.—Huaral, Peru[4] (26).

Conclusions.—*Pygochelidon flavipes* Chapman is a perfectly good species distinguishable from *cyanoleuca* by cinnamon rufous throat and upper chest, darker than in immature *cyanoleuca,* blackish sides of body, and dull purplish blue upper surface.

It appears to inhabit the temperate zone of the Andes, descending to the subtropical, from Peru north to Colombia. It must be very rare as it has been collected on but three occasions and is known from but three specimens.

Atticora cyanoleuca cyanoleuca usually occurs in the mountainous districts of Central and South America from Costa Rica southward to southern Brazil, Uruguay and Tucumán. It is non-migratory.

Atticora cyanoleuca patagonica is the southern and temperate zone representative of *cyanoleuca.* It breeds from Buenos Aires Prov., Argentina, on the east and Oruro Prov., Bolivia, south to Tierra del Fuego. In the northern parts of its breeding range it nests in the temperate zone, leaving the subtropical to *cyanoleuca* (Bolivia, Tucumán). Immature birds from Callipampa, Bolivia show an approach toward typical *cyanoleuca* in having the chest tinged with buffy, otherwise they are quite typical of *patagonica.*

---

[6] Laubmann, Wissen. Erg. Deutsch. Gran Chaco Exp., p. 303, 1930.

[7] Hellmayr, Bds. Amer., VIII, p. 56, 1935.

In the southern winter *patagonica* migrates northward as far as Trinidad and the Canal Zone. While in winter quarters it is found frequently in the Tropical Zone.

Of the migration of *patagonica* Hudson says, " In Buenos Ayres they appear early in September . . . before the middle of March not one remains, the migration of this species being very regular." (Sclater and Hudson, Argent. Orn., I, pp. 33-35, 1888).

Durnford says that in the Prov. of Buenos Ayres it " arrives at the end of September, and generally leaves in March; but this year I observed two a little north of Buenos Ayres on the 30 of April." (Ibis, 1877, p. 170). Durnford found them nesting along the Chuput River, Patagonia, in November (l. c. p. 32).

At Cape San Antonio, Prov. of Buenos Ayres, Argentina the species nests in late October (Gibson, Ibis 1918, p. 383).

Venturi says, " Dans la province de Tucumán, pendant les mois de fevrier et mars, elle pond 3 oeufs blancs . . . " (Hartert and Venturi, Novit. Zool., XVI, p. 169).

Belcher and Smooker record that " birds in immature or at least off season plumage visit Trinidad in June and July, when hundreds may be seen congregated on telegraph wires near San Fernando " (Ibis, 1937, p. 560).

Chapman (Amer. Mus. Novit., no. 30, p. 4) records a specimen from Cosnipata (2300 ft.) Peru as late as October 17, which is a very late date indeed but if the bird actually is *patagonica* this record is no more remarkable than the taking by von Sneidern of a Maryland Yellow-Thoat (*G. trychas*) in the Chocó on June 16. It is not impossible that *patagonica*, or something like it, may be found breeding in the temperate zone of Peru. The question of the races of *Atticora cyanoleuca* in Peru appears best left to Dr. Zimmer, for he has more material from that country than has any museum in the world.

In this connection it is most interesting to note that Sharpe and Wyatt in their Monograph of the Hirundinidae (vol. 2, genus IX, p. 2, 1885-94) say, " We should feel inclined to recognize *A. patagonica* as a race, but for the fact that specimens from Cosnipata in Peru appear to be intermediate, and we must leave the subject to future inquirers to determine ". The above-mentioned authors record specimens from Cosnipata February 9 (wing 4.1, =104 mm.), March and September.

Pinto (Cat. das Aves do Brasil, 1944) does not record *patagonica* from Brazil, but our Descalvados specimens show that it occurs in that country, and it cannot help but cross parts of Brazil during its migration.

Both *cyanoleuca* and *patagonica* have been recorded from Tucumán, and from Bolivia. In Bolivia *patagonica* is known from greater altitudes than *cyanoleuca* and such must also be the case in Tucumán. Undoubtedly *cyanoleuca* breeds in the subtropical zone and *patagonica* in the temperate zone.

Summer specimens (June, July) from Trinidad differ from other specimens examined by having longer (7-8 mm.), and basally wider bills. They may belong to a form breeding in some other section of southern South America than that occupied by *patagonica.*

Atticora cyanoleuca peruviana is closest to *patagonica* and resident on the coast of Peru, up to 7000 ft., from the Chilean border north to the Dept. of Libertad.

In Piura it is replaced by a bird intermediate in color of the under wing-coverts, but otherwise resembling *cyanoleuca.*

Atticora fasciata (Gmelin)

Two males and four females from La Morelia have been compared with examples from Cayenne, Peru, and Bolivia. If anything, birds from Bolivia are sligthly larger than northern birds, rather than smaller. In color I can see no difference.

Measurements (in millimeters) of the material examined is as follows: La Morelia, ♂ wing, 93, 98; tail 68; ♀ wing, 99.5, 101.5, 102.5; tail, 70.5, 71, 75. Cayenne, o wing, 101.5, 104, 104; tail, 72, 72.5, 73. Peru, ♂ wing, 101, 103; tail, 71; ♀ wing, 98, 99, 100, 103, 104; tail 72, 76, (rest worn). Bolivia, ♂ wing, 97.5, 99; tail, 71, 73; ♀ wing, 102, 103; tail, 79, 80.5.

Orochelidon murina murina (Cassin)

A series of nine birds from Nariño (Cumbal, Chiles), 4 from Laguneta, 7 from Pichincha, and 9 from Peru show varying degrees of green to blue gloss on the upper surface. None, however, is as " navy " blue on the back as birds from Hichuloma, La Paz, Bolivia, named *O. m. cyanodorsalis* by Carriker.

Cassin's type is a green-backed bird which bears Verreaux's original label. It reads, " Hirundo, Equateur ".

NOTULAE NATURAE

NUMBER 162 OF JANUARY 18, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE TYPE SPECIMENS OF C. B. ADAMS'S JAMAICAN SPECIES OF VITRINELLA

BY HENRY A. PILSBRY

Curator of Mollusks, The Academy of Natural Sciences of Philadelphia

Professor C. B. Adams instituted the new genus *Vitrinella* in 1850 for five new species of minute gastropods found in beach sand from Jamaica.[1] No genotype was selected, and none of the species were figured.

W. Kobelt, 1879,[2] named *V. valvatoides* C. B. Ad. as type, and W. H. Dall, 1889,[3] regarded that species "as the type of the genus as revised by the brothers Adams"; but this is a later Panamic species, not in the original list of *Vitrinella*.

In 1897 Katharine J. Bush[4] reviewed the genera of minute vitrinellid and cyclostrematid shells with special reference to species of our Atlantic coast. *Vitrinella helicoidea* C. B. Ad. was designated type of *Vitrinella*. It was redescribed and figured from specimens taken off Hatteras. The new family Vitrinellidae was proposed for this and related genera.

So far as I know, *V. helicoidea* is the only one of Adams's five species recognized by any subsequent author. By kindness of Mr. Wm. J. Clench of the Museum of Comparative Zoology, Harvard College, where Professor Adams's collection is now deposited, I am able to figure these types, add descriptive notes supplemental to the original descriptions, and refer the species to their modern genera. Since Adams's ten-page pamphlet of ninety-five years ago was privately printed, is now rare and not generally accessible, his descriptions are reprinted below.

---

[1] Monograph of Vitrinella, a new genus of new species of Turbinidae. Amherst, Mass., February, 1850.

[2] Illustrirtes Conchylienbuch, 2:162.

[3] "Blake" Report, in Bull. Mus. Comp. Zool., 18:360.

[4] Revision of the marine gastropods referred to Cyclostrema, Adeorbis, Vitrinella and related genera, Trans. Conn. Acad., 10.105, 122.

"Most of the specimens were obtained from a pint of sand, which contained 110 species of shells, and which was taken from a surface of three or four square yards of sand beach in a little cove near Port Royal, Jamaica, on the outside of the peninsula. A few were found on the inside of the peninsula."

Vitrinella helicoidea C. B. Adams Fig. 1.

Vitrinella helicoidea C. B. Adams, 1850, Monog. Vitrinella, p. 9.—Bush, 1897, Trans Conn Acad., 10.122, pl 23, figs 9, 9a.

"Discoidal: white, opaque and translucent in transverse alternating lines: with a single impressed spiral line near the summit of the whorls, and very fine irregular transverse striae: apex very obtuse: spire slightly and convexly elevated: whorls four, moderately convex, rapidly increasing, with a lightly impressed suture; last whorl regularly rounded, a little compressed beneath. Aperture not modified by the last whorl: labium with a rather thick deposit: umbilicus large and deep, with a spiral carina, exhibiting all the whorls. Mean divergence about 150°; length of spire .01 inch; total length .03 inch; greatest breadth .075 inch; least breadth .06 inch." (Adams.)

This milky-transparent species has been redescribed and figured by Miss Bush from a slightly larger specimen from off Cape Hatteras in 16 fathoms.

The "impressed spiral line" mentioned by Adams is the internal suture, visible by transparence, not external sculpture. The spiral figure of the suture, in dorsal view, is rather large, slightly exceeding half of the total diameter. The umbilicus is like a spiral stair, its side walls vertical, slightly overhung by the small spiral cord. The columella is a little thickened, and runs forward near its upper insertion. Growth-striae are extremely weak, where visible. Diameter 1.75 mm., height 1.00 mm.; 3½ whorls.

Vitrinella tincta C. B Adams Figs. 3, 6.

Vitrinella tincta C B. Adams, 1850, Monog Vitrinella, p. 8.

"Globose discoidal: white, translucent, with stains of reddish purple on the last whorl: with numerous spiral striae, and two small distant revolving carinae on either side of the periphery of the last whorl: apex obtuse: spire convex, but little elevated: whorls three, rapidly increasing from the first, with a well impressed suture; last whorl somewhat concave beneath the lower carina: aperture scarcely modified by the last whorl: umbilicus deep, not very wide. Mean divergence about 135°; length of spire .015 inch; total length .035 inch; greatest breadth .055 inch; least breadth .045 inch." (Adams.)

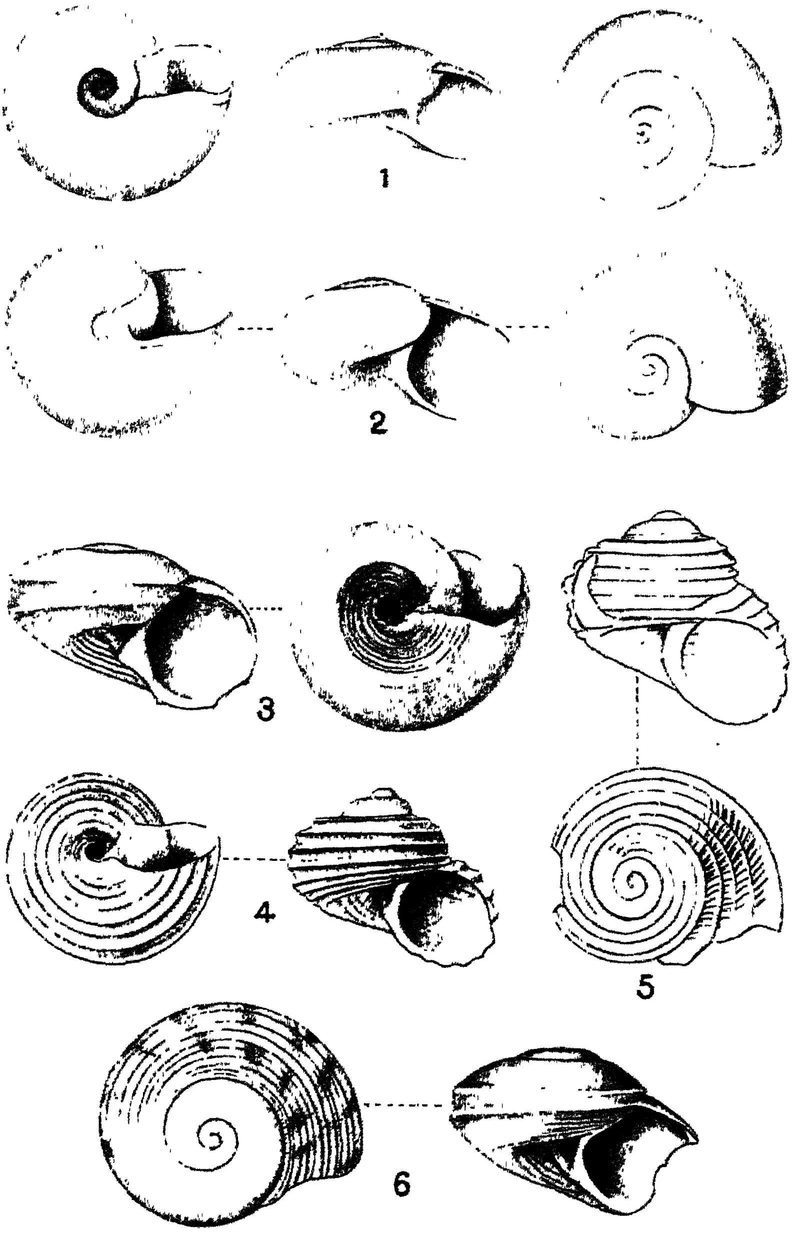


FIG. 1.—*Vitrinella helicoidea*. 2.—*Teinostoma megastoma* 3, 6.—*V. tincta*. 4, 5.—*Cyclostrema interruptum*.

This species is represented by two specimens. The type (fig. 6) is badly broken, but has the surface somewhat better preserved, showing pale brownish vinaceous radial clouds on the upper surface of the last whorl, which is minutely striate spirally. The base also has very minute spiral striation. The shape is depressed subglobose, with low convex spire. Whorls about 2¾ to 3, joined by a distinctly impressed suture. The periphery is flattened and obtusely biangular. The base has a median angle.

In the second specimen (fig. 3) the "stains of reddish purple" mentioned by Professor Adams are not visible on the white surface, which is dull and beachworn, showing spiral striation only where protected, in the umbilical concavity. The peristome is thin, and in this shell irregularly broken. The columella is reflexed, with a median point at the termination of a strong but narrow spiral cord which contracts the umbilicus. The parietal callus is very thin. Diameter 1.1 mm., height 0.7 mm.

The reflection of the columella is somewhat exaggerated by reason of the broken outer lip, and consequent rolling of the shell towards the left, in order to show the full width of the aperture.

The most remarkable feature of the type specimen of this species is the color, which suggests *Omphalius* of the *fasciatus* group, which is also somewhat similar in structure of columella and umbilicus. I have not been able to compare young *Omphalius* nearly as small as *V. tincta*, but the smallest seen do not have the carinate base or such minute striation as *V. tincta*, and the apical whorl seems larger, though it is not perfect in those compared. Moreover, *V. tincta* does not appear to be pearly within. The color variegation is elsewhere unknown in Vitrinellidae, I believe.

"Vitrinella" hyalina C. B. Adams

Vitrinella hyalina C. B. Adams, 1850, Monog. Vitrinella, p. 5

The glass tube which should contain this species had been shattered before it came into my possession, and the specimen was not found. In addition to Professor Adams's original label there is a slip upon which Miss Bush had written: "not true Vitrinella = Natica ? K. J. B."

Teinostoma megastoma (C. B. Adams) Fig. 2.

Vitrinella megastoma C. B. Adams, 1850, Monog. Vitrinella, p. 7.

"Much depressed, transversely ovate: white, translucent: smooth and shining: apex very obtuse: spire convex, but little elevated: whorls a little more than three, moderately convex, with a distinct suture; last whorl very large, rapidly increasing in the last part, well rounded: aperture scarcely modified by the last whorl: umbilical region very widely and deeply indented. Mean divergence about 130°; length of spire .01 inch; total length .033 inch; greatest breadth .06 inch, least breadth .045 inch." (Adams.)

The shell is transparent, glassy, quite thin and globose for *Teinostoma*, with very large aperture, and a very small, sloping umbilical callus, which is flat or slightly concave, the base rising around it. The wholly superficial suture is bordered by a false sutural line by transparence: sometimes this gives the illusion of a deeply impressed suture. Diameter 2 mm., height 1.2 mm.; nearly 3½ whorls.

This was rather abundant. By the very small umbilical callus it agrees with *Pseudorotella*, as Miss Bush has noted on the label. The paratype figured is the largest in the lot. Adams's measurements were apparently from a smaller one. Except in size, the dozen specimens are all very much alike.

Cyclostrema interruptum (C. B. Adams) Figs. 4, 5.

Vitrinella interrupta C B Adams, 1850, Monog. Vitrinella, p. 6

" Depressed globose conic: white, subtransparent in the last whorl: with three rather large more or less elevated spiral grooves above, and five or six of less size beneath; with somewhat distant opaque white transverse striae, which are interrupted by the spiral grooves: apex very obtuse: spire with very convex outlines: whorls four, quite convex, with a moderately impressed suture; last whorl rather large, rapidly increasing, well rounded: aperture scarcely modified by the penult whorl: umbilical region widely and deeply indented. Mean divergence about 100°; length of spire, .915 inch; total length .035 inch; greatest breadth .045 inch; least breadth .038 inch." (Adams.)

The nuclear shell, of a trifle over two whorls, is smooth. With the third whorl, three spiral ridges begin abruptly, their intervals crossed by axial threads as in the detail finished in fig. 5. On the last whorl there are about 9 spirals, those above the periphery slightly larger and more widely spaced. The last spirals, around the umbilicus, are quite weak, so that the count of ribs may be a little indefinite, 8 to 10. The larger of two specimens in the Adams collection is broken, our figures of it left unfinished except for a detail of sculpture, fig. 5. The two specimens measure:

Diameter 1.2 mm., height 1 mm.; 3½ whorls.

Diameter 1.05 mm., height 0.82 mm.

Except by its somewhat smaller size, this species very closely resembles *C. sanibelense* Pils. It belongs to a new subgenus of *Cyclostrema* to be defined in another place by Mr. McGinty and the author. *C. interruptum* (C B. Ad.), *C. sanibelense* Pils. and *C. zacalles* Mazyck appear to be three size stages, otherwise nearly alike.

NOTULAE NATURAE

NUMBER 163 OF JANUARY 23, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

COLOMBIAN ZOOLOGICAL SURVEY. PART III.[*]—NOTES ON COLOMBIAN BIRDS

BY RODOLPHE MEYER DE SCHAUENSEE

Curator of Birds, The Academy of Natural Sciences of Philadelphia

The following paper is a report on a small collection of birds forwarded by Brother Nicéforo-María from the collections of the Museo del Instituto de la Salle, Bogotá (29 specimens), and by Dr. Armando Dugand from the collections of the Instituto de Ciencias Naturales of the Universidad Nacional of the same city (19 specimens).

The collections, consisting mostly of single specimens, contain many interesting forms, some of which have been known heretofore only from so called " Bogotá " collections.

Two forms are described as new, one a paroquet, the other a puff-bird.

My thanks are due to Brother Nicéforo-María and Dr. Dugand for the privilege of examining these birds.

---

[*] The following papers, previously published by the Academy, belong in this series although not numbered as parts of the same:

BOND, J. AND R. M. DE SCHAUENSEE.—On some Birds from southern Colombia, Proc. A.N.S.P., vol. 92, pp. 153-169, 1940.

DE SCHAUENSEE, R. M.—A new *Muscisaxicola* from Colombia, Not. Nat., no. 98, 1943; A new Species of Dove of the genus *Leptotila* from Colombia, Not. Nat., no. 122, 1943; Notes on Colombian Parrots, Not. Nat., no. 140, 1944; Notes on Colombian Woodpeckers, with the description of a new Form, Not. Nat., no. 141, 1944; Notes on Colombian Birds, with a description of a new Form of *Zenaida*, Not. Nat., no. 144, 1944; Notes on Colombian Antbirds, Ovenbirds and Woodhewers, with a description of a new Form from Peru, Not. Nat., no. 153, 1945; Notes on *Buteo magnirostris*, with a description of a new Form from Peru, Not. Nat., no. 156, 1945; Notes on Colombian Birds, Proc. A.N.S.P., vol. 97, pp. 1-16, 1945; Notes on Colombian Flycatchers, Manakins and Cotingas, Proc. A.N.S.P., vol. 97, pp. 41-57, 1945.

FOWLER, H. W.—Fresh-water Fishes from northwestern Colombia, Poc. A.N.S.P., vol. 96, pp. 227-248, 1944.

Specimens from the Museo del Instituto de la Salle, Bogotá are identified as M.I.S. in the following paper, and those from the Instituto de Ciencias Naturales of the Universidad Nacional of Bogotá as I.C.N.

Aratinga leucopthalmus nicefori new subspecies

TYPE.—ad., no. 25, Museo del Instituto de la Salle, Bogotá, Colombia, collected at Guaicaramo, Río Guavio, Cundinamarca-Meta, on November 4, 1937.

Description.—Close to *Aratinga finschi* (Salvin), of Central America, in coloration, differing only in having the red patch on the forehead more restricted, 14 mm. in width instead of 20 mm.; the plumage deeper, less yellowish green, and by larger size, wing 190 vs. 175 mm. for *finschi.*

From *Aratinga leucopthalmus callogenys* (Salvadori) this new form differs by having a solid band of red on the forehead, and by paler, more yellowish green plumage.

Measurements of type.—Wing 190, tail 158.5, culmen from cere 29 mm.

Range.—Known only from type locality.

Remarks.—This most interesting parrot, as may be seen from the description, is intermediate between *A. l. callogenys,* which has recently (Not. Nat., no. 140, p. 3, 1944) been recorded from the Caquetá region, and *A. finschi,* known from Nicaragua southward to western Panama. Thirty-three specimens of *A. leucopthalmus* from Bolivia and Brazil northward to the Caquetá region have been examined and not one shows, at the most, more than two or three red feathers scattered on the forehead. The existence, hitherto unsuspected, of this intermediate form will justify attaching the Central American bird to the species *leucopthalmus* and in future it should be known as *Aratinga leucopthalmus finschi,* rather than be allowed to stand alone.

The present bird has nothing whatsoever to do with the bird with the red forehead recorded by me from Caquetá region as *A. wagleri transilis* (Not. Nat., no. 140, p. 2, 1944). The latter has green under wing-coverts while *nicefori* has them scarlet and yellow as do both *leucopthalmus* and *finschi.*

This new bird is named in honor of Brother Nicéforo-María.

Piaya cayana mehleri Bonaparte

A specimen from Guayabal, north of Cúcuta (no. 27, M.I.S.) clearly belongs to this pale form rather than to *mesura* (Cabanis and Heine).

Bogotá is the type locality originally given for both this form and *mesura.* I should like to suggest Cartagena as the type locality for *mehleri,* leaving Bogotá for the more southern *mesura.*

Glaucidium brasilium ucayalae > medianum

A single female from Villavicencio, Meta (No. 10, M.I.S.) is intermediate between *ucayalae* and *medianum*. It is more heavily streaked below than two males of the latter from Mamatoco and Fundación, and less so than three *ucayalae* from La Morelia.

Nyctibus griseus griseus (Gmelin)

A male from Villavicencio, Meta (no. 29, M.I.S.), from its size would appear close to the nominate race. Its wing measures 261 mm., and the tail 175 mm.

An unsexed specimen from Surinam (topotypical of *griseus*) has a wing of 255 mm., a tail of 168. A male from Tauary, Rio Tapajos has a wing of 254 mm., and a tail of 176 mm. Other specimens in the Academy's collection measure as follows: *panamensis*, ♂ Gatún, wing 285.5, tail 195 mm.; ♂, Munchique, wing 283, tail 208.5 mm.; ♂ (brown phase), Munchique, wing 282, tail 206 mm.—*cornutus*, ♂, Rió Surutú, Bolivia, wing 273, tail 185; o, Peru, 266, tail 189 mm.

In color, our Surinam bird is brownish gray as are the specimens from Gatún, Munchique and Villavicencio while birds from Peru, Bolivia, and the Rio Tapajos, Brazil are purer gray.

As Griscom and Greenway have said (Bull. Mus. Comp. Zool., 88, no. 3, p. 160, 1941), Amazonian birds are intermediate between *cornutus* and *griseus*.

The specimen sent by Brother Nicéforo, however, is closest to typical *griseus*. The two Munchique birds, although I wrote *panamensis* on their labels, through a slip were recorded as *griseus* (Proc. A.N.S.P., 97, p. 3, 1945). Their measurements, of course, show them to be *panamensis* and the record should be corrected.

Panamensis probably occurs throughout Colombia, west of the Eastern Andes. In northeast Colombia a smaller bird close to *griseus* is found, and perhaps in the Caquetá *cornutus* occurs, for Chapman records from eastern Ecuador a bird with a wing of 273 mm. and a tail of 193 (Bull. Amer. Mus. Nat. Hist., 55, p. 275, 1926).

Eubucco bourcieri occidentalis Chapman

A specimen from Campo Bello, Western Andes (no. 1517, I.C.N.) agrees with a topotype from San Antonio and other Western Andean examples.

Malacoptila fulvogularis substriata Sclater

In the Proceedings (vol. 97, p. 16, 1945), I recorded two specimens from the headwaters of the Magdalena as belonging to this form, at the same time noting that they differed from Sclater's plate (Monog. Jac. and Puffbs., pl. XLIII) by having the striations on the upper surface more marked, and those on the lower surface less so than in the specimen figured.

Brother Nicéforo has sent a specimen from the Llanos del Meta (no. 16, M.I.S.) which agrees exactly with Sclater's plate, and is obviously true *substriata* hitherto known from two "Bogotá" specimens.

Malacoptila fulvogularis huilae new subspecies

Type.—♂ ad., A.N.S.P. no. 156725, collected at El Isno, Dept. of Huila, Colombia, by Kjell von Sneidern, on July 9, 1942.

Description.—Differs from *M. f. fulvogularis* Sclater by broader streaks on the crown, white moustachial streak not nearly so broad or well marked, streaks on the lower surface more diffused, consequently much less regular in appearance.

Differs from *M. f. substriata* Sclater by having the streaks on the upper surface carried farther down the back, while the moustachial streak is somewhat more evident (in *substriata* it is not solid, but replaced with narrow white centers to the feathers). Streaking of lower surface more diffused, streaks and terminal spots on the wing coverts more marked.

Measurements of type.—Wing 98, tail 87.5, culmen, from anterior edge of nostril, 19 mm.

Range.—Known only from the head of the Magdalena Valley.

Material examined.—*M. f. fulvogularis*, 4 ♂, 10 ♀, from Bolivia and Peru; *M. f. huilae*, ♂, ♀, El Isno, Huila; *M. f. substriata*, o, Llanos del Meta.

Remarks.—Sclater's type of *substriata*, and the only subsequently known specimen, came from "Bogotá" collections, probably having been taken on the llanos to the east of Bogotá. Brother Nicéforo's specimen tends to confirm this supposition for his bird agrees minutely with Sclater's plate, while upper Magdalena birds do not. I therefore would suggest the Llanos del Meta as the type locality for *substriata* Sclater.

The nominate form extends from Bolivia northward to eastern Ecuador. Zimmer (Field Mus. Nat. Hist., zool. ser., no. 282, vol. 17, 1930, pp. 300-301) shows that *M. f. melanopogon* Berl. and Stolcz., described from Garita del Sol, Peru, is not recognizable and my material confirms this view.

Nonnula brunnea Sclater

Two specimens from Medina (north of Villavicencio) and the llanos east of Bogotá (nos. 11 and 18, M.I.S.) are a trifle paler both above and below than a specimen from eastern Ecuador. As the birds have been mounted, this difference is probably due to fading.

West of the Andes *N. frontalis* is found. I regard it, and the Santa Marta form as well marked subspecies of *Nonnula ruficapilla* (Tschudi) of Peru.

Venilornis kirki cecilii (Malherbe)

A single specimen (no. 1, M.I.S.) from the Río Cauca (southern part of the Dept. of Antioquia) differs from 11 specimens of *cecilii* from Santa Marta, western Colombia and Ecuador by having the upper wing-coverts streaked on the median line with pinkish white. I cannot but take this to be individual variation as in other respects it agrees exactly with *cecilii.*

The tail, on the under surface is regularly banded but this character varies with individuals, some having much more obviously banded tails than others.

Picumnus lafresnayei Malherbe

A specimen from Puerto Asís, Putumayo (no. 3, M.I.S.) agrees with an Ecuadorean specimen. The species was known previously in Colombia from Belén, Caquetá (Not. Nat., 141, p. 3, 1944).

Myrmotherula surinamensis subsp.

A single specimen (no. 2, M.I.S.) from Barrigón, east of Villavicencio agrees closely with an immature male of *pacifica* from Nuquí, Chocó (A.N.S.P. no. 147216). The only difference between the two is the slightly wider bill in the Barrigón bird.

From an immature male from Cayenne it differs chiefly by the much paler rufous crown.

No form of *surinamensis* has been recorded previously from east of the Andes in Colombia. This record lessens greatly the distance between *pacifica* and its nearest known relatives. It will be of great interest to see more birds from eastern Colombia.

Myrmotherula fulviventris salmoni (Chubb)

A female from Cunday (475 meters), Tolima (no. 12, M.I.S.), agrees well in measurements, with specimens from El Tambor, Santander, although the tail is even longer (see my remarks on this form Not. Nat., no. 153, p. 3, 1945).

The throat patch is much less marked with black, and the tail is longer, than in west Colombian and west Ecuadorian birds.

The tail measures 42.5 mm. as against 30-35.5 (ave. 32.5) for 33 western specimens of the nominate form. The tails of five birds from El Tambor (*salmoni*) measured 37-39 mm. As the present specimen has been mounted and is much faded, nothing can be said about its color.

Synallaxis cinnamomea cinnamomea Lafresnaye

This little known bird has hitherto been know in Colombia only from native Bogotá collections. Phelps has recorded specimens from La Sabana in Venezuela (Bol. Soc. Venez. Cien. Nat., no. 56, p. 303, 1943). A specimen (no. 23, M.I.S.) has been forwarded by Brother Nicéforo from Icononzo, Tolima-Cundinamarca (1300 meters), the first definite locality for the species in Colombia.

Philydor rufus panerythrus Sclater

A specimen taken at Aguadita (1900 meters), Cundinamarca, on the west slope of the Eastern Andes, a little to the south and west of Bogotá (no. 9, M.I.S.). This form is known from Costa Rica, Panama, and "Bogotá" whence the type came. Hellmayr says (Bds. Amer., pt. IV, p. 206, footnote b.) "the type—the only known specimen ever taken in South America—differs from four others by decidedly lighter cinnamon-rufous wings and slightly darker backs."

The present specimen differs from one from Costa Rica by being duller cinnamon below, by having the crown darker, the forehead, lores, sides of head and eyebrow much less rufescent, and the back somewhat more olivaceous.

Unfortunately the Aguadita specimen has been mounted and it is hard to tell how much these differences are due to fading. If they are not, then the Central American bird is separable.

Thripadectes flammulatus flammulatus (Eyton)

A pair belonging to this species from the western slope of the Western Andes differs from an example from Fómeque (1930 meters), east of Bogotá, (no. 15, M.I.S.) by having slightly larger bills, ♂ 21.5, ♀ 22, vs. 19 mm. for the Fómeque bird. A male from Pichincha has a bill of 22 mm.

It is interesting to note that in *Thripadectes virgaticeps* the largest billed birds are found in the southern part of the range of the species.

Thripadectes holostictus holostictus (Sclater and Salvin)

A single example from Pacho (1860 meters), Cundinamarca (no. 26, M.I.S.), is very much more rufescent on the remiges, abdomen and flanks, than Central and Western Andean examples.

The Pacho bird has been mounted which may account for some of the difference.

Xiphorhynchus guttatus nanus (Lawrence)

A male (no. 2900, I.C.N.) from Caracolicito (250 meters), Magdalena, differs from a series from Panama, Santa Marta, and Gamarra (Magdalena), by being paler both above and below than is usual. However, A.N.S.P., no. 148869 from Garachiné, Darien, is very close to it.

Xiphorhynchus guttatus guttatoides Lafresnaye

A male from Caño Suria (450 meters) Apiay, Meta, (I.C.N.) agrees with specimens of this form from La Morelia and Peru. At first glance it appears to be more narrowly streaked on the back but this is due to the feathers of the hind neck and mantle being pushed up into the skull.

Myiozetetes cayennensis rufipennis Lawrence

A specimen in the Academy from the Tristram Collection, of unmistakable Bogotá preparation, and marked " Bogotá ", is typical of this form.

A male from Río Ariari, south of Villavicencio and San Martín, Meta (no. 6, M.I.S.) is not quite as bright, the rufous of the basal portion of the primaries being interrupted along the shaft. Hellmayr (Bds. Amer., pt. V, p. 139, foot note *a*) notes a divergence toward typical *cayennensis* in Orinocan birds.

This race has not previously been recorded from Colombia.

Myiarchus cephalotes caucae Zimmer

A specimen from La Candela, Huila (no. 9257, I.C.N.).

Knipolegus poecilurus poecilurus Sclater

A male from El Tambo, Cauca (I.C.N.).

Empidonax virescens (Vieillot)

A specimen from Bogotá, undated (I.C.N.).

Tolmomyias sulphurescens confusus Zimmer

A single, not fully adult specimen from Sasaima (1230 meters), Cundinamarca (no. 17, M.I.S.), apparently belongs to this form. Its crown is definitely gray and the wing measures 66 mm.

Myiochanes cinereus bogotensis (Bonaparte)

A juvenile male in spotted plumage from La Mesa (1300 meters), Cundinamarca (no. 7, M.I.S.), and another almost adult (no. 19, M.I.S.) from the same locality.

Mecocerculus leucophrys setophagoides (Bonaparte)

A specimen from Bogotá (I.C.N.).

Phaeomyias murina incomta (Cabanis and Heine)

A specimen from Chicoral, Tolima (no. 22, M.I.S.), and another (no. 14, M.I.S.) in very worn plumage taken in March at Espinal (440 meters), Tolima.

Camptostoma obsoletum bogotensis Zimmer

A male from Villavicencio (no. 20, M.I.S.). A female (no. 21, M.I.S.), from San Gil (1100 meters), is closest to this form differing only from the Villavicencio bird in having the dorsal surface a trifle greener. It differs from Cauca Valley birds (*caucae*) by being paler above and in having the chest yellowish instead of grayish.

Turdus grayi incomptus Bangs

A male (no. 323, I.C.N.) taken at Santa Cruz (50 meters), Atlántico, on July 19, is in very worn plumage. It agrees with Santa Maria specimens.

Turdus serranus atro-cericeus (Lafresnaye)

A single female (no. 24, M.I.S.) taken at Buenavista (1230 meters), (Villavicencio), agrees best with this race, which has not previously been recorded from Colombia. The bill is larger than in females of *fuscobrunneus*, and is yellow, which apparently is rare among females. In a series of 17 females from Bolivia (*serranus*) only one has a yellow bill.

Catharus aurantirostris phaeopleurus Sclater and Salvin

A specimen from Munchique (I.C.N.). Zimmer (Auk, 61, July 1944, pp. 404-408) has shown that *griseiceps* and *aurantirostris* can be treated as a single species.

Diglossa albilatera albilatera (Lafresnaye)

A specimen (I.C.N.) from Choachí (1970 meters), Cundinamarca, is duller rufescent below than usual, but can be matched by A.N.S.P. no. 149157 also from Choachí.

Females appear unstable in color, some being more rufous below than others, some more olivaceous above. From my material, these differences are not correlated with locality.

Tanagra musica intermedia (Chubb)

A female from Choachí (I.C.N.).

Tanagra xanthogaster brevirostris (Bonaparte)

A male (no. 9365, I.C.N.) from La Candela. The white-spotted outermost rectrices are missing.

Tanagra chrysopasta chrysopasta (Sclater and Salvin)

A female from Villavicencio (no. 13, M.I.S.)

Tangara arthus sclateri (Lafresnaye)

A male of this distinct form from Contratación (ca. 1700 meters), Santander (no. 4, M.I.S.). This form has hitherto been known only from native " Bogotá " collections.

Tangara xanthogaster venusta (Sclater)

A male from La Candela (no. 9637, I.C.N.).

Tangara ruficapilla (Sclater)

A pair from Popayán and a male from La Campina, Fusagasugá (nos. 3187, 3336, C-8, I.C.N.) show the usual variation in the amount of blue shading. The East Andean specimen shows albinism by having the outer tail-feathers white.

Hemithraupis guira guirina (Sclater)

A female from Purificación (400 meters), Tolima (no. 5, M.I.S.).

The fixing of the name *guirina* for birds either from the west, or the east slope of the Eastern Andes rests on the re-examination of the original specimens in London, as explained by Hellmayr (Bds. Amer., pt. 9, footnote, p. 378).

Hemithraupis flavicollis albigularis (Sclater)

An immature male, with part of the crown olive, and the remiges and wing coverts edged with yellowish olive, was secured at Purificación (no. 28, M.I.S.).

Spinus psaltria colombianus (Lafresnaye)

An adult male from the Sabana de Bogotá, and an immature male from Popayán (nos. 229 and 3335, I.C.N.).

Atlapetes refinucha caucae Chapman

A male in very worn plumage taken at Popayán, April 21 (no. 3350, I.C.N.).

NOTULAE NATURAE

NUMBER 164 OF JANUARY 25, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW ORDOVICIAN ASAPHID TRILOBITE FROM PENNSYLVANIA

BY B. F. HOWELL

Curator of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia

Of the several species of the Ordovician genus of Asaphid trilobites, *Onchometopus*, that have been described from North America, one common Chazyan species, *O. obtusus* (Hall), is remarkable because its test is covered with large puncta. This species has been reported from the Day Point and Valcour formations of the Lower Ordovician Stones River portion of the Chazyan section of the Lake Champlain region, but has not been found elsewhere, as far as the writer has been able to ascertain.

There is in the paleontological collection of the Academy of Natural Sciences of Philadelphia a pygidium and a free cheek of an *Onchometopus* from the Middle Ordovician Chambersburg Limestone near Shippensburg, Pennsylvania, which resembles the pygidium of the Stones River *O. obtusus* in having its upper surface covered with large puncta, but differs in being very much larger and in being longer in proportion to its width. The free cheek associated with this Chambersburg Limestone pygidium also differs from the free cheek of *O. obtusus* in having a genal spine. The Chambersburg Limestone species is therefore believed to represent a new species. It is described as such below.

TRILOBITA

OPISTHOPARIA

ASAPHIDAE

Onchometopus grandis new species Figure 1.

Known only from a single complete pygidium and an associated imperfect free cheek.

The free cheek is so imperfectly preserved that some of its features cannot be seen; but it appears to resemble in general form the free cheek of *Onchometopus obtusus* (Hall), as the cheek of that species is depicted by Raymond in figure 2 of plate 18 of volume 7 of the Annals of the Carnegie Museum (1910) and in figure 2 of plate 38 of the Report of the State Geologist of Vermont for 1909-1910 (also published in 1910), except that the anterior portion of the cheek of *O. grandis* is relatively longer than the corresponding part of the cheek of *O. obtusus* and that the genal angle of *O. grandis* is prolonged into a short spine, while that of *O. obtusus* is abruptly terminated so that no spine is present. The free cheek of *O. grandis* is covered with large puncta, as is the free cheek of *O. obtusus*.

The pygidium is longer in proportion to its width, and more triangular in shape, than the pygidium of *O. obtusus*, but is otherwise similar. It is uniformly convex and does not have a depressed border. The axis is poorly defined, tapers rather rapidly, and ends at some distance from the rear margin of the shield. It shows no trace of segmentation, and no indication of ribs is visible on the pleural lobes. The entire surface of the shield is covered with large puncta, as is the case with the pygidium of *O. obtusus*.

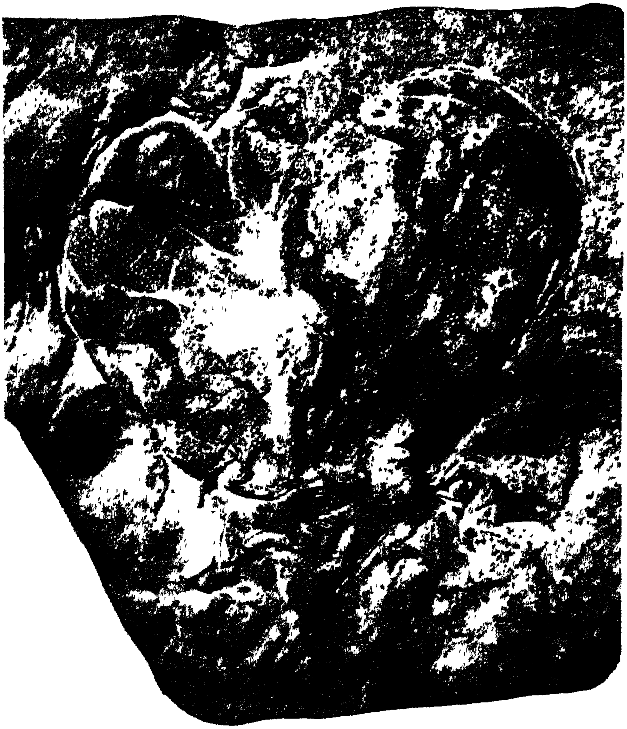
Location of type.—The holotype is A.N.S.P. 16734.

Range.—The holotype is from gray limestone of the Middle Ordovician Chambersburg Formation at the Letterkenny Ordnance Depot, about 5 miles northeast of Chambersburg, Pennsylvania, not far south of Shippensburg.

Discussion.—*O. grandis* is probably a Medial Ordovician descendant of the Early Ordovician species, *O. obtusus*. It has the large puncta which are characteristic of *obtusus*, but is twice the size of that species and differs from it somewhat in the form of the pygidium and the free cheek.

The eyes of *O. grandis* are relatively smaller than those of *O. obtusus*, as they are pictured by Raymond in figure 1 of plate 34 of the Report of the State Geologist of Vermont for 1909-1910 and in figure 1 of plate 12 of volume 3 of the Annals of the Carnegie Museum (published in 1905); but these figures, which are drawings, are probably inaccurate in respect to the size of the eyes, for in the description of *O. obtusus* that accompanies the figure in the Vermont report Raymond states that the eyes of that species are small. The drawing on which the figures were based, in which the eyes are depicted as being large, was evidently made before 1905 and was probably based on poorly preserved specimens, for in the description accompanying the 1905 figure (on page 344 of volume 3 of the Carnegie Museum Annals) Raymond stated that the eyes were "large." The photograph of a well preserved cephalon of *O. obtusus* which Raymond presented in figure 2 of plate 18 of volume 7 of the Carnegie Museum Annals and in figure 2 of plate 38 of the Vermont Report, although it does not show the eyes very distinctly, appears to depict them as being smaller than they are shown to be in the earlier drawing. If our interpretation of their photographic illustration is correct the eyes of *O. obtusus* are relatively of about the same size as those of *O. grandis*.

It is hoped that a cranidium of *O. grandis* may soon be discovered that will show just what the shape of the head shield was and what was the size of the eyes in that species.



1

FIG. 1.—Pygidium and free cheek of *Onchometopus grandis*, new species, from the Chambersburg Formation near Shippensburg, Pennsylvania The holotype. × 1.

NOTULAE NATURAE

NUMBER 165 OF JANUARY 30, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON A COLLECTION OF FISHES FROM TRINIDAD

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

In 1931 I reported four installments of fishes collected in Trinidad and the neighboring part of Venezuela and sent to the Academy through the cooperation of Mr. Arthur W. Sewall, president of the Barber Asphalt Company. Shortly after the publication of that report a further lot was received from the same source which forms the basis of the present paper. This comprises 143 specimens representing 40 species, one of which is described as new. These specimens were collected by Mr. Louis Wehekind and some of them represent species not before reported from Trinidad. References are given only for those not noticed in my report on the fishes of The Fifth George Vanderbilt Expedition.[1]

My own works pertaining to the fishes of Trinidad are as follows:

1915. The Fishes of Trinidad, Grenada and St. Lucia, British West Indies. Proc. Acad. Nat. Sci. Phila., 1915, pp. 520-546, Trinidad, pp. 520-543, figs. 1-4, with bibliography in footnote.

1931. Fishes obtained by the Barber Asphalt Company in Trinidad and Venezuela in 1930. L. c., 1931, pp. 391-410, Trinidad, pp. 391-406, figs. 1-5.

1943. Some Trinidad Fresh-water Fishes. The Fish Culturist, vol. 22, no. 9, May 1943, pp. 65-67, figs. 1-6.

ALBULIDAE

Albula vulpes (Linnaeus)

Esox vulpes Linnaeus, Syst. Nat., ed. 10, vol. 1, 1758, p. 313 (type locality, Bahama Islands) (on *Bone fish* Catesby, Nat. Hist. Carolina, 1737, pl. 2, fig. 1, Bahamas).

Four, 164 to 270 mm., Port of Spain. These show 9 slightly darker transverse diffuse cross bands, also each row of scales above lateral line with a longitudinal dark band along scale junctures.

---

[1] Acad. Nat. Sci. Phila., Monographs no. 6, 1944, pp. 57-529, figs. 1—268, pls. 1-20.

TETRAGONOPTERIDAE

Astyanax bimaculatus (Linnaeus)

Salmo bimaculatus Linnaeus, Syst. Nat., ed. 10, vol. 1, 1758, p. 311 (type locality, "in America meridionali").

Twelve, 70 to 140 mm., La Cruz River, June 12, 1930; seven, 70 to 103 mm., Port of Spain market, June 1930; two, 115 to 122 mm., Maracas River, June 29, 1930; three, 104 to 106 mm., Tumpuna River, June 14, 1930.

CURIMATIDAE

Curimata argentea Gill

Curimatus argenteus Gill, Ann. Lyc. Nat. Hist. New York, vol. 6. 1858, p. 62 (type locality, Trinidad).

Eleven, 88 to 98 mm., Tumpuna (Tompuna on some maps) River, June 14, 1930.

CALLICHTHYIDAE

Corydoras aeneus (Gill)

Hoplosoma aeneum Gill, Ann. Lyc. Nat. Hist. New York, vol. 6, 1858, p. (43)403 (type locality, Trinidad).

Three, 58 to 63 mm., Tumpuna River. June 14, 1930. Although Gill says "all of the fins are immaculate," the caudal shows at least traces of some darker brown spots scattered on its rays, apparently at least 4 or 5 on the median rays. D. I, 7, i, in smallest I, 6, i.

LORICARIIDAE

Plecostomus robinii (Valenciennes)

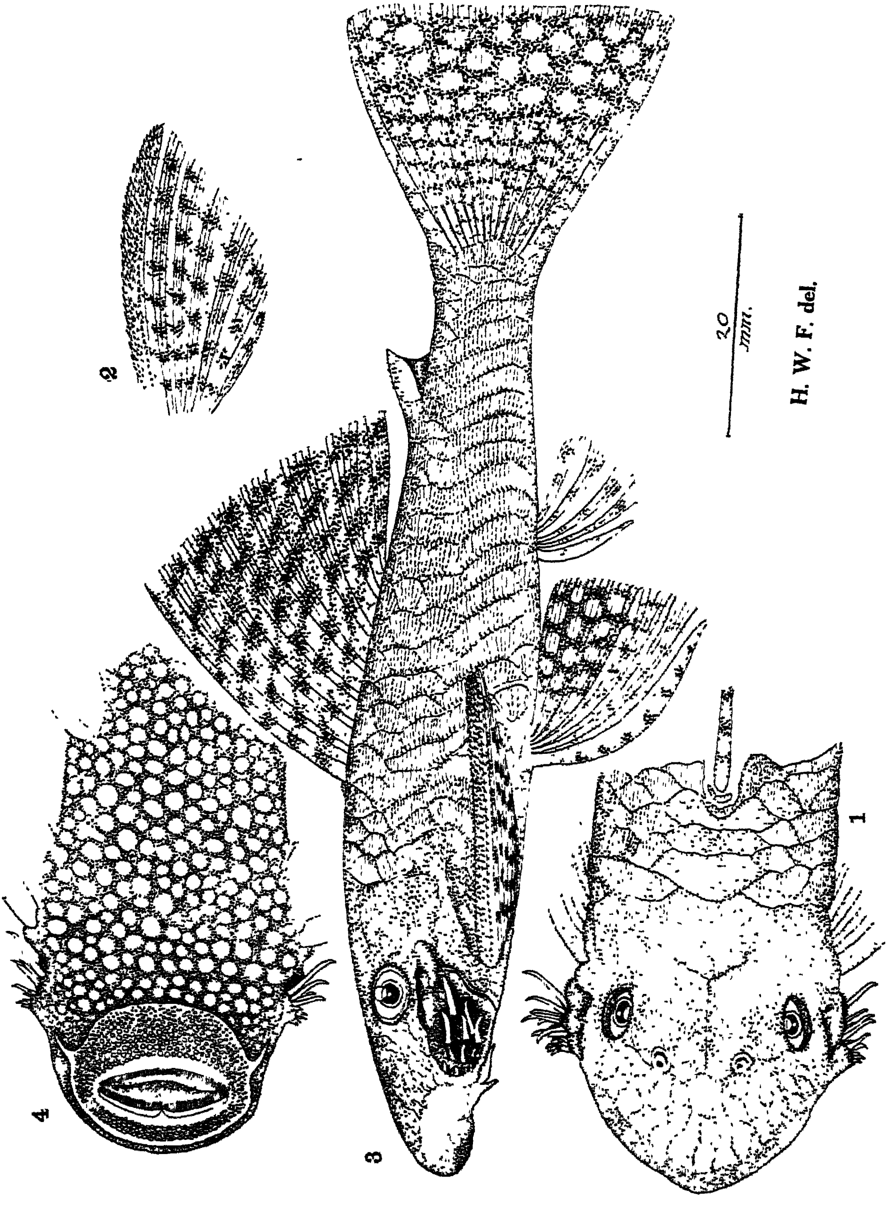
Hypostomus robinii Valenciennes, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 15, 1840, p. (370) 501 (type locality, Trinidad; affluents of la Plata).

One, 159 mm., Maracas River, June 29, 1930; two, 155 to 228 mm., Maracas River, June 13, 1930.

Ancistrus maracasae new species

Figures 1 (head above), 2 (right pectoral above), 3 (lateral view) and 4 (ventral view of head and trunk).

Depth $4\frac{7}{8}$; head $4\frac{1}{4}$, width $1\frac{1}{3}$ in its length. Snout (in profile) $1\frac{1}{4}$ in head, as seen above, broadly arched with rather narrow submargin of soft skin all around little less in width than half eye diameter; eye $4\frac{1}{4}$ in head, $2\frac{7}{8}$ in snout, 3 in interorbital; buccal disk width about $1\frac{1}{10}$ in length of head, lateral barbel little less than eye and surfaces well papillated; broad lower lip with papillated area 3 times as wide as upper lip; teeth very fine, slender, ends recurved, little expanded and bifid, about 45 each side above and below, the dental bases with length half interorbital space; principal



FIGS. 1 TO 4.—*Ancistrus maracasae* new species.

interopercular spines 12 each side with posterior each side longest. others graduated shorter forwards and ends of all recurved; interopercular spines all quite contrasted, as they are white with pale brownish tips, and basally invested with dark integument; lower edge of small opercle with row of even spinules or small denticles. Gill opening very slightly greater than eye.

Scutes 22 + 2 in lateral series; 5 between dorsal and ventral bases. Scutes all with more or less denticulated edges and striate on exposures. all more or less as rows of minute denticles. Under surfaces of head and belly covered with smooth skin.

D. I, 7, spine terminally flexible with length 1$\frac{2}{5}$ in predorsal space; adipose fin with deep compressed spine, finely spinescent above and long as eye; A. I, 4, spine flexible, first ray 1$\frac{4}{5}$ in head; least depth of caudal peduncle 2$\frac{1}{8}$; caudal obliquely truncate behind. lower rays slightly longer or fin 2$\frac{7}{8}$ in rest of fish; pectoral I, 6, rigid spine slightly arched, becomes spinescent terminally and fin 3 in fish without caudal; ventral I, 5, spine arched, terminally flexible and spinescent, fin slightly exceeding head.

Color in alcohol dark olivaceous brown above, uniform. Skin around front border of snout, gill opening, in pectoral axil and along base of dorsal livid gray black. Iris gray. Under surface of head and belly dark brown, with innumerable pale gray to whitish variable spots, all closely set. Buccal disk very pale or light brown, and strongly contrasted with rest of dark under surfaces. Dorsal with general color pale brown, with dark to blackish bars crossing the rays, less distinct on membranes. Caudal similar, only paler basally, or cross bars less distinct basally on fin. Pectoral with blackish spots on rays, formed as transverse bars. Ventral pale brown, dark spots on spine and dark spots on rays terminally, darkest on innermost 3 rays. Anal pale brown, rays with 3 dark spots.

A.N.S.P., no. 71723. Maracas River, Trinidad. January 29, 1930. Louis Wehekind. Length 108 mm. Type.

Only the type secured. Regan evidently describing the type of *Hypostomus guacharote* Valenciennes, concludes that the type locality originally given as Porto Rico is questionable. Involving Gill's account of *Ancistrus guacharote*,[2] Regan gives a description certainly not in agreement with the present species. It differs in the following details: eye 5$\frac{3}{4}$ in head to end of temporal plate; 20 moderately stout interopercular spines, with shorter external bristles; lower surface of head with small granular patch behind each gill cleft; first dorsal ray 1$\frac{1}{4}$ in head; dorsal base length little less than its distance from adipose fin; pectoral spine reaches first fourth of ventral; caudal deeply emarginate; color uniformly olivaceous. Gill's account is also equally at variance as he gives the coloration as reddish brown, the body immaculate and the fins clouded with a darker color. Other comparisons with Gill's description are: head broad as long (length $\frac{3}{4}$ its width in

---

[2] Ann. Lyceum Nat. Hist. N. Y., vol. 6, 1858, p. 49 (Trinidad).

A. maracasae); eye 2½ in interorbital (3 in *A. maracasae*); predorsal space twice length of head (head 1¾ in predorsal in *A. maracasae*); space between last dorsal ray and adipose fin spine half length of base of dorsal fin (⅔ of dorsal base in *A. maracasae*). Gill gives the length as 4 or 5 inches.

(Named for the Maracas River.)

ECHIDNIDAE

Lycodontis jordani Evermann and Marsh

Lycodontis jordani Evermann and Marsh, Rep. U. S. Fish Comm., pt. 25, 1899 (December 19), p. 352 (type locality, Mayaguez, Porto Rico); Bull. U. S. Fish Comm., vol. 20, 1900, p. 78, pl. 2 (type).

Gymnothorax jordani Meek and Hildebrand, Field Mus. Pub., no. 215, Zool. ser. vol. 15, pt. 1, 1923, p. 167 (Fox Bay, Colon).

One, 398 mm., Gasparee Island, June 26, 1930. Not previously reported from Trinidad. Compared with Baldwin's colored figure, as published by Evermann and Marsh, the above specimen differs in having whitish spots on the snout and entire top of the head, the eye ringed with black all around, white spots on tail posteriorly larger and fewer, also in this region the alternating black and white blotches on the dorsal and anal fins more contrasted, or the blackish intervals more extensive and the tip of the tail white.

OPHICHTHIDAE

Ophichthus gomesii (Castelnau)

Ophisurus gomesii Castelnau, Animal. Nouv. Amer. Sud, Poiss., 1855, p. 84, pl. 44, fig. 2 (type locality, Rio de Janeiro).

Head 3 to vent; combined head and trunk 1⅕ in tail. Snout (in profile) 5⅗ in head; eye 7½, 1½ in snout, 1⅔ in interorbital; mouth cleft 2⅓ in head; teeth biserial in jaws and on vomer. Gill opening 5½ in head. Dorsal begins slightly behind middle in depressed pectoral. Brown, whitish below. Edges of dorsal and anal posteriorly dark gray to blackish.

One, 520 mm., Brighton Pier, June 12, 1930.

MUGILIDAE

Agonostomus monticola (Bancroft)

One, 168 mm., Maracas River, June 29, 1930.

CENTROPOMIDAE

Centropomus ensiferus Poey

Centropomus ensiferus Poey, Memor. Hist. Nat. Cuba, vol. 2, 1860, p. 122 (type locality, Havana, Cuba).

Two, 78 to 88 mm., Nariva River, June 17, 1930.

SERRANIDAE

Garrupa nigrita (Holbrook)

Serranus nigritus Holbrook, Ichth. South Carolina, ed. 1, 1856, p. 173, pl. 25, fig. 2 (type locality, Charleston, S. C.).

Depth 3; head $2\frac{1}{5}$. Snout $4\frac{1}{8}$ in head measured from snout tip, equals interorbital; eye $5\frac{1}{4}$, $1\frac{1}{3}$ in snout, equals interorbital; maxillary reaches $\frac{2}{3}$ in eye, length $2\frac{1}{2}$ in head from snout tip; preopercle edge irregularly serrated, with 3 larger denticles directed down at angle. Gill rakers 10 + 16. Cheek with 32 scales between eye and preopercle angle. D. X, 14, I; A. III, 9, I.

Color in alcohol dark sepia brown generally. Black streak in groove of maxillary above only on right side of fish. Iris dark olive gray. Dorsals, anals and ventrals gray black. Caudal and pectoral very pale or light brown.

One, 156 mm., Port of Spain, June 21, 1930. Not previously recorded from Trinidad.

PRIACANTHIDAE

Priacanthus arenatus Cuvier

One, 150 mm., Port of Spain; one, 170 mm., Maracas Bay, June 12, 1930. Apparently not previously reported from Trinidad.

CARANGIDAE

Alepes amblyrhynchus (Valenciennes)

Caranx amblyrhynchus Valenciennes, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 9, 1833, p. (76) 100, pl. 248 (type locality, Brazil).

Three, 230 to 252 mm., Port of Spain market, June 13, 1930. Not previously reported from Trinidad. All have dark brown basal pectoral blotch.

Trachinotus glaucus (Bloch)

Two, 98 to 104 mm., Port of Spain, June 1930. Depth $2\frac{1}{4}$ to $2\frac{2}{5}$. Both agree with Meek and Hildebrand's photographic figure except that the front edges of soft dorsal and anal, also of upper and lower caudal lobes, are blackish.

Trachinotus falcatus (Linnaeus)

Labrus falcatus Linnaeus, Syst. Nat., ed. 10, vol 1, 1758, p. 284 (type locality, America).

One, 75 mm., Port of Spain, June 1930. Depth $1\frac{3}{5}$.

LUTJANIDAE

Lutjanus griseus (Linnaeus)

Labrus griseus Linnaeus, Syst. Nat., ed. 10, vol. 1, 1758, p. 283 (type locality, Bahamas) (on *Mangrove snapper* Catesby, Nat. Hist. Carolinas, 1743, pl. 9, Bahamas).

One, 150 mm., Nariva River, June 17, 1930.

Lutjanus analis (Cuvier)

Mesoprion analis Cuvier, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 2, 1828, p. (341) 452 (type locality, Santo Domingo, W. I.).

Nine, 107 to 168 mm., Port of Spain Harbor, June 4, 1930.

Rhomboplites aurorubens (Cuvier)

Centropristes aurorubens Cuvier, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 3, 1829, p. (34) 45 (type locality, Brazil; Martinique; Santo Domingo).

Two, 119 and 120 mm., Port of Spain market, June 1930. Not previously reported from Trinidad.

GERRIDAE

Eucinostomus argenteus Baird and Girard

Eucinostomus argenteus Baird and Girard, in Baird, Ninth Ann. Rep. Smithson. Inst., 1854 (1855), p. 345 (type locality, Beesley's Point, New Jersey).

One, 150 mm., Port of Spain Harbor, June 4, 1930; five, 140 to 178 mm., Monas Island, Trinidad, June 26, 1930. Depth $2\frac{3}{4}$. Premaxillary groove open. Pectoral fin scaleless.

POMADASYIDAE

Haemulon bonariense Cuvier

Haemulon bonariense Cuvier, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 5, 1830, p. (174) 254 (type locality, Buenos Aires, Argentina).

One, 150 mm., Port of Spain, June 21, 1930. Pectoral with small basal area covered with a number of very fine or small scales. Metzelaar's figure (in 1919) differs in that the pectoral has large scales at its base and no small ones out on the base of the fin, also the soft vertical fins are not shown with small scales on their outer portions.

Anisotremus surinamensis (Bloch)

Depth $2\frac{1}{2}$; 9 scales between lateral line and first dorsal origin; D. XII, 15; A. III, 10. Dark median lateral band from upper front end of snout, extends through eye and back to caudal base where end is separated as dark spot largely above end of lateral line; another parallel band above nostrils and along upper edge of eye, then back to upper edge of caudal peduncle; third parallel band from occiput back to below hind part of second dorsal base.

One, 178 mm., Monas Island, Trinidad, June 26, 1930. Not previously reported from Trinidad.

SCIAENIDAE

Odontoscion dentex (Cuvier)

Corvina dentex Cuvier, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 5, 1830, p. (103) 139, pl. 109 (type locality, Santo Domingo, Port au Prince Bay).

One, 121 mm., Gasparee Island, June 26, 1930. Compared with Werner's rather indifferent colored figure as published by Cuvier, my specimen differs in its scaly preorbital, infraorbital, maxillary, preopercle flange, pectoral base, ventrals and the soft vertical fins densely scaled nearly to their edges. Not only is the pectoral base contrasted black, but also its axil and space above on humeral region are likewise.

SPARIDAE

Calamus calamus (Valenciennes)

Depth $2\frac{1}{8}$; head $3\frac{1}{4}$; scales 44 + 4 in lateral line, 7 above to spinous dorsal origin; 6 in horizontal series on cheek. Snout dark brown and still dark from above eye across interorbital space, and broad darker brown band down from lower edge of eye over hind end of maxillary.

One, 208 mm., Port of Spain.

Diplodus argenteus (Valenciennes)

Sargus argenteus Valenciennes, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 6, 1830, p. (44) 60 (type locality, Brazil).

Two, 83 to 100 mm., Port of Spain, June 1930. Not previously reported from Trinidad.

EPHIPPIDAE

Chaetodipterus faber (Broussonet)

Chaetodon faber Broussonet, Ichth. Descript. Decas., London, 1782, pl. 4 (type locality, Jamaica; Carolina; Society Islands).

Two, 198 to 200 mm., Port of Spain, June 13, 1930.

CICHLIDAE

Aequidens pulcher (Gill)

Cychlosoma pulchrum Gill, Ann. Lyc. Nat. Hist. New York, vol. 6, 1858, p. 22 (type locality, Trinidad).

Four, 70 to 83 mm., Port of Spain market, June 1930; three, 76 to 82 mm., Tumpuna River, June 10, 1930; three, 54 to 121 mm., La Cruz River, June 12, 1930; two, 118 to 135 mm., Maracas River, June 29, 1930. Cheek with 3 rows of scales.

Cichlasaurus bimaculatus taenia (Bennett)

Chromis taenia Bennett, Proc. Zool. Soc. London, 1830, pt. 1, p. 112 (type locality, Trinidad).

Two, 75 to 124 mm., Tumpuna River, June 10, 1930. Characterized by its coloration, especially the black upper basal caudal spot, the finely spotted caudal, etc. Bloch's crude colored figure of *Labrus punctatus* may have been intended for the present form, but it is too inaccurate for certain identification. Compared with my specimen, the soft dorsal and anal, and paired fins, are shown as far too long and the markings on the rayed vertical fins greatly different.

Crenicichla saxatilis (Linnaeus)

Sparus saxatilis Linnaeus, Syst. Nat, ed. 10, vol 1, 1758, p. 278 (type locality, Surinam).

One, 107 mm., Port of Spain market, June 1930; one, 103 mm., Tumpuna River, June 10, 1930; three, 88 to 128 mm., La Cruz River, June 12, 1930.

POMACENTRIDAE

Pomacentrus fuscus Cuvier

Pomacentrus fuscus Cuvier, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 5, 1830, p. (324) 432 (type locality, Brazil).

Three, 80 to 100 mm.; " Torechay " Bay, June 14, 1930.

Abudefduf analogus (Gill)

Two, 125 to 133 mm., Monas Island, June 26, 1930; three, 103 to 130 mm., Gasparee Island, June 26, 1930. In the largest, the black spot at pectoral origin narrows below and extends down as blackish bar to lower basal part of fin. In smallest on left side of body, the second and third transverse dark bands are fused at the lateral line. Not previously reported from Trinidad.

SCARIDAE

Cryptotomus roseus Cope

Cryptotomus roseus Cope, Trans. Amer. Philos. Soc., vol. 14, 1871, p. 462 (type locality, St. Martin's, West Indies).—Fowler, Proc. Acad. Nat. Sci. Phila., 1915, p. 257, fig. 1 (Kingston, St. Vincent, W. I.; type).—Metzelaar, Rapp. Kol. Curaçao, 1919, p. 110 (St. Eustatius).—Meek and Hildebrand, Field Mus. Publ., no. 249, Zool. ser. vol. 15, 1928, p. 734 (Fox Bay, Colon).—Longley, in Longley and Hildebrand, Carnegie Inst. Wash. Publ., no. 535, 1941, p. 205 (Tortugas).

Nine, 108 to 153 mm., Port of Spain, June 21, 1930. Not previously reported from Trinidad.

Cryptotomus auro-punctatus (Valenciennes)

Callyodon auro-punctatus Valenciennes, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 14, 1839, p. (215) 290 (type locality, Santo Domingo).

Depth 3; head $2\frac{1}{8}$. Snout pointed, $2\frac{3}{4}$ in head; eye $4\frac{1}{3}$, $1\frac{1}{2}$ in snout, equals interorbital. No posterior canines. No lilac line from upper jaw to eye and no row of dark spots crossing caudal.

One, 102 mm., Port of Spain. Reported from Trinidad by Longley in 1941.

STROMATEIDAE

Peprilus paru (Linnaeus)

Stromateus paru Linnaeus, Syst. Nat., ed. 10, 1758, p. 248 (type locality, Jamaica).

Four, 153 to 181 mm., Port of Spain, June 27, 1930.

SCORPAENIDAE

Scorpaena plumieri Bloch

One, 205 mm., Maquerope Bay, June 24, 1930.

Scorpaena brasiliensis Cuvier

Scorpaena brasiliensis Cuvier, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 4, 1829, p. (224) 305 (type locality, Brazil).

One, 138 mm., Port of Spain, June 21, 1930.

TRIGLIDAE

Prionotus punctatus (Bloch)

Trigla punctata Bloch, Naturgesch. Ausl. Fische, vol. 7, 1793, p. 125 (?not pl. 353) (type locality, Antilles Islands).

Depth $4\frac{1}{3}$ to $4\frac{4}{5}$; head $2\frac{1}{3}$ to $2\frac{2}{3}$. Snout $2\frac{1}{4}$ to $2\frac{2}{7}$ in head; eye 4 to $4\frac{2}{3}$, 2 to $2\frac{1}{5}$ in snout, greater than interorbital; maxillary not or quite reaching front of eye, length $2\frac{3}{5}$ to $2\frac{4}{5}$ in head. Gill rakers 5 + 16. Tubes 50 in lateral line; 9 scales above lateral line to soft dorsal origin, 22 below to anal origin; 14 or 15 predorsal. Suborbital stay with small spine opposite front part of eye from which many fine striae radiate. Front edge of snout with 14 or 15 divergent flat denticles, followed by small recurved spine before front nostril and posteriorly another behind hind nostril. Antero-interorbital spine large, with row of small denticles on its hind edge graduated shorter downward. Spines long and slender on opercle, humeral region and preopercle, especially in larger specimen. D. X, I, 11, I; A. I, 10, I.

Color in alcohol gray brown above, whitish below. Above with scattered ill-defined darker spots, one more or less as dark bar down from front of eye on cheek. Iris gray, with diffuse darker blotches. First dorsal grayish, with darker clouding. Second dorsal pale or whitish with more or less inclined rows of brown spots. Anal and ventral white. Caudal pale, with 3 transverse dark bands and dark brown blotch above and another below basally, fins more grayish terminally. Pectoral black, with 7 transverse black bars, most distinct above.

Two, 93 to 108 mm., Port of Spain, June 2, 1930. Jordan and Hughes have given a description in their key [3] with the depth as $2\frac{4}{5}$, based on 2 small specimens.

CEPHALACANTHIDAE

Cephalacanthus volitans (Linnaeus)

One, 88 mm., Port Cumana, 1930; one, 150 mm., Port of Spain, June 21, 1930.

MONACANTHIDAE

Stephanolepis hispidus (Linnaeus)

Eight, 67 to 98 mm., Port Cumana, 1930. D. 30 to 32.

OSTRACIIDAE

Lactophrys tricornis (Linnaeus)

Two, 35 to 98 mm., Port Cumana, 1930.

DIODONTIDAE

Chilomycterus antennatus (Cuvier)

Diodon antennatus Cuvier, Mem. Mus. Hist. Nat. Paris, vol. 4, 1818, p. 131, pl. 7 (upper right figure) (type locality, no locality).

One, 87 mm., Port of Spain, June 21, 1930. *Chilomycterus briareos* Metzelaar [4] is based on a specimen 270 mm. long and seems to differ only in color as its figure shows small black spots most everywhere.

---

[3] Proc. U. S. Nat. Mus., vol. 9, 1886, p. 328 (Tuxpan, east coast of Mexico).

[4] Rapp. Kolon. Curaçao, 1919, p. 173, fig. 55 (type locality, St. Eustatius).

NOTULAE NATURAE

NUMBER 166 OF FEBRUARY 15, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

ON LOWER CRETACEOUS FRESH-WATER MOLLUSKS OF SAGE CREEK, WYOMING

BY TENG-CHIEN YEN

Research Fellow, Department of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia[1]

The interesting collection of fresh-water mollusks treated in this paper was submitted by Dr. J. D. Love, of the U. S. Geological Survey, and was entrusted to me for study by Dr. John B. Reeside, Jr. As the beds from which it came had long been considered part of the Morrison formation, of Jurassic age, and as the fauna contains forms that show it to belong to a widespread Lower Cretaceous assemblage, it has seemed desirable that the species be described and recorded in detail.

The locality of the collection is on the Shoshone Indian Reservation, in sec. 7, T. 1 S., R. 1 E., W. R. M., at the south end of the Sage Creek dome, Fremont County, Wyoming, and about 12 miles northwest of the town of Lander. The horizon is 80 feet below the base of a sandstone that has often been called "Lakota sandstone" by local geologists and 12 feet above a conglomerate that has by some been called the base of the Cloverly formation and by others been placed in the Morrison formation. The status of the Morrison formation in this area is, however, in doubt, as few horizons can be traced reliably over the region and it is not yet determined where the Jurassic-Lower Cretaceous boundary lies.

The fossils are imbedded in hard, coarse-grained, slightly sandy limestone of light grayish color. The shells are replaced by calcite, very brittle and easily broken in the course of preparation. However, the specimens obtained from the weathered limestone are in comparatively good state of preservation. The collection contains 14 species of mollusks, 4 pelecypods and 10 gastropods, representing 13 genera of 9 families, among which 4 genera and 5 species are herein described as new.

---

[1] And Research Geologist supported by the Penrose Fund of the Geological Society of America.

In completing this paper, I wish to express my thanks to the administrative officers of the Geological Society of America for the financial aid to my research project. I am also thankful to Dr. John B. Reeside, Jr., of the U. S. Geological Survey, for his kindness and encouragement as well as his valuable suggestions, by which I have been benefited from time to time; to Dr. Henry A. Pilsbry, of the Academy of Natural Sciences of Philadelphia, for his constant advice, which I have obtained during my stay in the Academy, where part of the work is carried on; to Mr. Charles M. B. Cadwalader, President of the Academy, and Dr. B. F. Howell, Curator of the Department of Geology and Paleontology, for their encouragement and the courtesy that I have enjoyed and for their effort in publishing this paper promptly.

Review of Literature

In 1861 Meek and Hayden described *Neritella nebrascensis* and *Lioplacodes veternus* from what they considered to be the base of the Cretaceous at the " head of Wind River." These two species represent the first records of Lower Cretaceous freshwater gastropods of North America. The exact locality is unknown, but it is generally believed to be located somewhere in the northern part of the Wind River Basin, not far southeast of Yellowstone Park.

Subsequently Walcott in 1884 reported upon a collection of fresh-water mollusks from the Eureka district of Nevada, which were then considered by him to be of Carboniferous age, but in 1939 F. S. MacNeil pointed out that the Eureka deposit belongs to the Lower Cretaceous. Species of *Protoelliptio, Physa, Viviparus* and some rissoid gastropods seem to be the characteristic forms of these beds.

T. W. Stanton in 1899 described three species from Yellowstone Park as from the Dakota sandstone. These have since been shown to be of Lower Cretaceous age.

The earliest record of fresh-water mollusks definitely assigned to the Lower Cretaceous on this continent was made by Stanton in 1903, from the Kootenai formation near Great Falls and Harlowton, Mont. The species described established a standard fauna that has been very useful for comparison with those of other regions.

In 1911 W. B. Clark described several species from Lower Cretaceous beds at Arlington, Md. Judged by his illustrations, nearly all his specimens were poorly preserved, but his records no doubt add to our knowledge of distribution of the fresh-water mollusks of that time.

In 1929 F. H. McLearn described six species of fresh-water pelecypods from the lower Blairmore formation in Alberta, Canada, which is of Lower Cretaceous age. Two species of the Sage Creek fauna are identical with forms described by McLearn, namely, *Unio hamili* and *Corbula? onestae*.

In 1932 L. S. Russell described a number of fresh-water mollusks from the McMurray formation in northern Alberta, which is believed to be of about the same age as the lower Blairmore. However, the species therein described, as the author has suggested, seem to indicate an estuarine habitat, so it probably explains that they have little in common with the molluscan fauna of true continental deposits reported elsewhere in Lower Cretaceous times.

COMPOSITION OF THE FAUNA AND ITS AGE

The recognizable forms of mollusks from this deposit are as follows:

UNIONIDAE:	*Protelliptio douglassi hamili* (McLearn)
	Sulcatapex cretaceus Yen, n. gen. and sp.
	"*Unio*" *farri* Stanton
SPHAERIIDAE:	*Eupera onestae* (McLearn)
NERITIDAE:	*Mesoneritina nebrascensis* (Meek and Hayden), n. gen.
AMNICOLIDAE:	*Protamnicola naticoides* Yen, n. gen. and sp.
	Stantonogyra silberlingi (Stanton), n. gen.
	Charydrobia cretacea Yen, n. sp.
VIVIPARIDAE:	*Lioplacodes cretaceus* (Stanton)
	Lioplacodes convexiculus Yen, n. sp.
ELLOBIIDAE:	*Tortacella* cf. *T. haldemani* (White)
PLANORBIDAE:	*Gyraulus* sp. undet.
LYMNAEIDAE	*Lymnaea sagensis* Yen, n. sp.
PHYSIDAE:	*Physa* cf. *P. walcotti* Yen and Reeside

The pelecypods and fresh-water operculate snails are the dominant forms in this deposit, from which its fluviatile origin may be inferred. The presence of abundant examples of young stages is consistent with the fact that several probably viviparous species occur in the fauna.

A number of determinable species included in this fauna indicate its Lower Cretaceous age, notably *Protelliptio douglassi hamili* and *Eupera onestae*, which McLearn reported from the " Unio beds " of the lower Blairmore formation in Alberta; *Stantonogyra silberlingi, Protelliptio douglassi,* and " *Unio* " *farri,* which Stanton described from the Kootenai formation in Montana; and *Lioplacodes cretaceus,* which he recorded from beds in Yellowstone Park now known to be Lower Cretaceous in age. None of these species are known from other than Lower Cretaceous formations.

The difficulty of separating in the field the beds containing the species treated in this paper from the Morrison beds involves no confusion so far as the molluscan findings are concerned. The elements herein recorded show very little in common with the Morrison species, as for instance those described by C. A. White from Canyon City, Colo., and by Yen and Reeside from Lower Green River Lake in western Wyoming. The latter locality lies a little over 100 miles west of Sage Creek dome and appears to occupy a similar stratigraphic position.

SYSTEMATIC ACCOUNT OF SPECIES

UNIONIDAE

Protelliptio douglassi hamili (McLearn) Fig. 1.

Unió hamili McLearn, Bull. 58, Nat. Mus. Canada, p 73, pl 18, figs 1-4. 1929

This species was described from the lower part of the Blairmore formation of Alberta. It differs from *P. douglassi* (Stanton) by the absence of two sharply elevated radiating riblets on the post umbonal slope.

Figured specimen, U. S. Nat. Mus. 103918. Unfigured specimen, A. N. S. P., 16801.

The occurrence in the present deposit is rather common, although the specimens are seldom well preserved.

SULCATAPEX new genus

Shell trapezoidal to subtriangular in outline, inflated and of thick substance, with more or less prominent umbones and strong ligament trace. Beaks near the anterior end, slightly incurved and sculptured, with broad, radiating wrinkles together with coarse, subregularly concentric costae. The corselet on the posterior dorsal margin is well marked. Hinge strong, with a broad plate; pseudocardinals of subrhomboid shape, ragged and heavy; laterals moderately developed, more or less impressed. Muscle scar deep and of irregular shape.

Genotype.—*Sulcatapex cretaceus* new species.

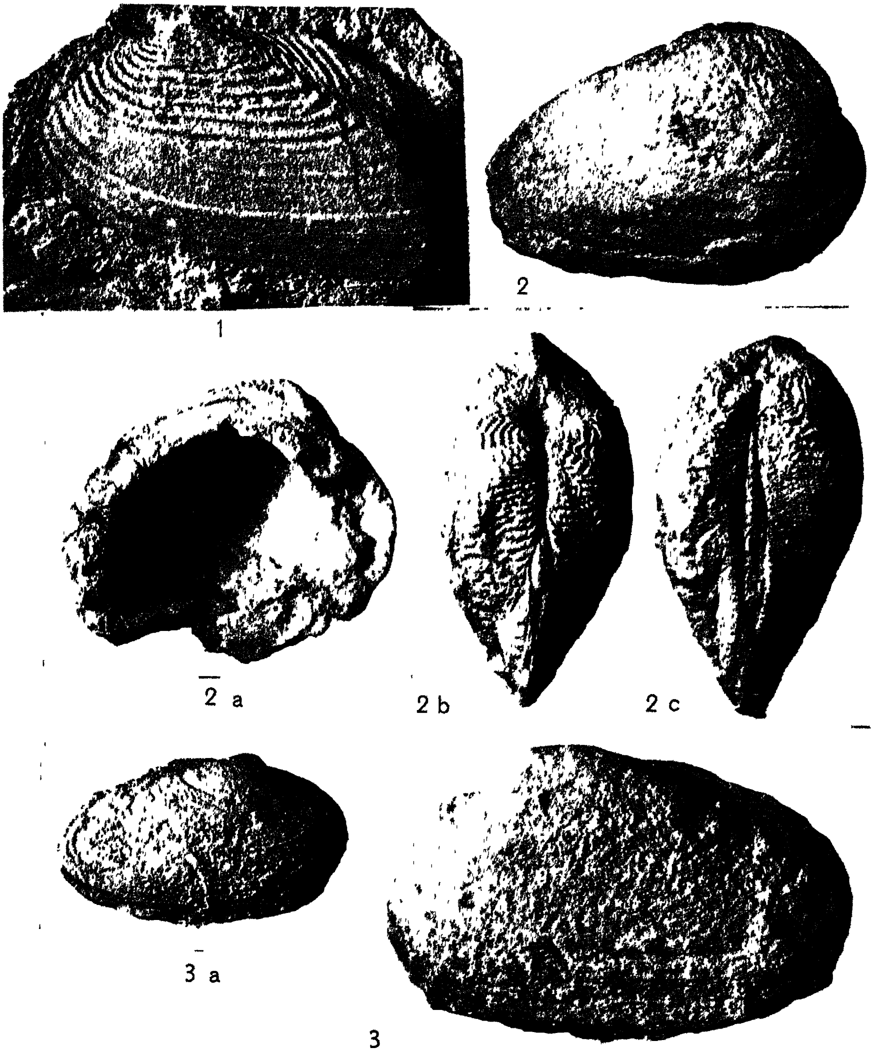


FIG. 1.—*Protelliptio douglassi hamili* (McLearn) (× 2). FIG. 2—*Sulcatapex cretaceus* new species (Nat. size). Holotype. FIGS. 2a, b, c.—*Sulcatapex cretaceus* new species (Nat. size). Paratypes. FIGS. 3. 3a—"*Unio*" *farri* Stanton (× 2).

The genus is characterized by its beak sculpture, rather wide hinge plate, heavy pseudocardinals, and weaker laterals. Its great convexity and the thick substance of the shells together with coarse concentric costae on the beaks remind one of the features of *Quadrula* Rafinesque, a genus that has been present since Upper Cretaceous times. However, the hinge plate and teeth of *Sulcatapex* are much less heavy and the beaks bear broad radiating sulcations. The beak sculpture is quite similar to that of *Proparreysia* Pilsbry (for *Unio percorrugata* Whitfield), but it differs by its wider hinge plate and heavier teeth.

Sulcatapex cretaceus new species Figs. 2, 2a-c.

Shell subtriangularly oblong in outline and of thick substance and strong ligament trace. Beaks well visible, slightly incurved, situated near the anterior end, and sculptured with 2 broad radiating wrinkles and 12 to 15 coarse concentric costae. General surface of the shell strongly convex, marked by heavy growth lines. The hinge plate rather broad and well arched, with heavy and ragged pseudocardinals on the left valve and presumably corresponding cavities on the right valve. The laterals much weaker, posterior ones much longer than anterior, gently curved but not deeply impressed. The anterior muscular scar large and deep.

Length of shell, 53.0 mm.; height, 41.0; convexity, 29.0.

The species is characterized by its subtriangular oblong outline, strong growth lines, heavy pseudocardinals, and short or nearly rudimentary anterior laterals.

Because of the brittle nature of the specimens the anterior part of the hinge line on the right valve has not been satisfactorily uncovered. It probably bears cavities corresponding to the strong pseudocardinals on the left.

Holotype, U. S. Nat. Mus., 103919; paratypes, U. S. Nat. Mus., 103920, 103921. Unfigured paratypes, A. N. S. P., 16802.

"Unio" farri (Stanton) Figs. 3, 3a.

Unio farri Stanton, Proc Am. Philos. Soc , vol. 42, p. 194, pl. 4, figs 1, 2, 1903.

This species, originally described from Wettacombe's ranch, near Musselshell River, in the vicinity of Harlowton, Mont., is represented in the present material mostly by younger individuals and is therefore of much smaller size than the type. The largest example measures 29.0 mm. in length, 21.0 in height, and 11.5 in convexity. A young specimen shows the presence of fine radiating lines on its beaks, but its hinge features are not known.

Figured specimen, U. S. Nat. Mus., 103922. Unfigured specimens, A. N. S. P., 16803.

SPHAERIIDAE

Members of this family often present difficulties for systematic studies. It is generally known that the external features of the shell are variable according to its habitat conditions. It was also found by early investigators in some living species that the hinges of those taken in still water are feeble and weak in comparison with the hinges of those living habitually in running water. In classifying these pelecypods, both external shell features and hinge structures should be taken into account, and unless substantial differences in kind be observed, it seems desirable to follow a more conservative course in systematic differentiation.

Eupera onestae (McLearn) Figs. 4a-f.

Corbula ? onestae McLearn, Bull. 58, Nat. Mus. Canada, p 75, pl. 14, figs. 1-4, 1929.

Eupera Bourguignat was described as a group of *Pisidium* (Rev. et mag. zoologie, sér. 2, t. 6, p. 675, 1854). A species of this group, *Pisidium moquinianum* (= *Cyclas modioliformis* Anton), was described by him on page 665 in the same publication and is therefore generally considered the genotype.

Living species of *Eupera* are known in Central and South America and Africa, and the genus has been recorded from Eocene deposits of Europe, western North America, and northern Asia.

The present species agrees with *Eupera* in external features of shell and hinge dentition, except that it bears two short parallel cardinals on the left valve and one on the right. The number of cardinals seems to vary in this genus, as it is well known that some living species of *Eupera* possess one on the left and none on the right.

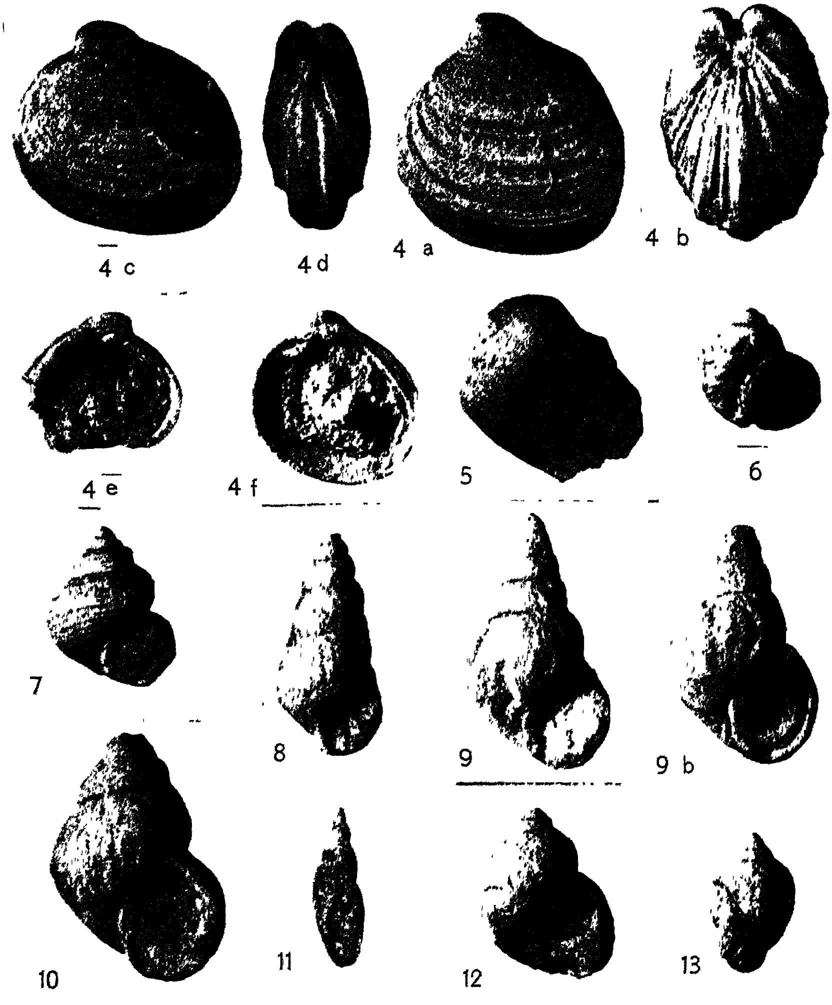
Numerous examples in the collection indicate its common occurrence. They agree well with the typical form described from the Blairmore formation in Alberta. Female specimens have shorter shells and greater convexity.

Figured specimen, U. S. Nat. Mus., 103924. Unfigured specimens, A. N. S. P., 16804.

NERITIDAE

MESONERITINA new genus

Shell of small size, moderately thick, with a small but slightly raised spire and rapidly dilated body whorl. Whorls smooth except for weak growth lines and scarcely convex, marked by irregular zigzag color patterns. Aperture broadly ovate, outer lip smooth and thin, columellar area nearly flat, well defined, thickened, and smooth, with a blunt and almost straight edge.



FIGS. 4a, b, c. d, e, f.—*Eupera onestae* (McLearn) (× 4). FIG. 5—*Mesoneritina nebrascensis* (Meek and Hayden) (× 4). FIG. 6.—*Protamnicola naticoides* new species (× 2). Holotype. FIG. 7.—*Stantonogyra silberlingi* (Stanton) (× 2). FIG. 8.—*Charydrobia cretacea* new species (× 4). Holotype. FIG 9.—*Lioplacodes convexiculus* new species (× 4). Holotype. FIG. 9b.—*Lioplacodes canvexiculus* new species (× 2). Paratype. FIG. 10.—*Lioplacodes cretaceus* (Stanton) (× 2). FIG. 11.—*Tortacella* cf. *T. haldemani* (White) (× 4). FIG 12.—*Lymnaea sagensis* new species (× 2). FIG. 13. —*Physa* cf *P. walcotti* Yen and Reeside (× 6).

Genotype.—*Neritella nebrascensis* Meek and Hayden.

The genus is characterized by its smooth thickened and nearly flat columellar plate and reminds one of *Fluvinerita* Pilsbry (Proc. Acad. Nat. Sci. Philadelphia, vol. 84, p. 12, 1932), which was described from the Recent fauna of Great River, Jamaica. However, the new genus has a more compressed outline and smaller spire and more thickened columellar plate.

Mesoneritina nebrascensis (Meek and Hayden) Fig. 5.

Neritella nebrascensis Meek and Hayden, Proc. Acad. Nat Sci. Philadelphia, vol. 13, p. 444, 1861.

Several specimens of this lot seem to be identical with this species, except for smaller size. The largest example measures 6.6 mm. in altitude, 7.0 in width, and has about three whorls.

Figured specimen, U. S. Nat. Mus., 103927. Unfigured specimens, A. N. S. P., 16805.

AMNICOLIDAE

PROTAMNICOLA new genus

Shell globose or subglobose in outline, narrowly perforate, having a low but definite spire and rapidly dilated body whorl. Whorls few, gently convex, increasing rapidly in size and bearing weak growth lines. Aperture of roundly ovate form, having its peristome continuous; outer lip thin, simple, and somewhat retreating at the lower part; inner lip well thickened, clearly defined, and gently arched, upper part of columellar margin filling partly the umbilical fissure.

Genotype.—*Protamnicola naticoides* new species.

The general outline and features of aperture of this new genus remind one of the genera *Flumnicola* Stimpson, *Pilsbryus* Yen, and *Lithoglyphus* Hartmann, which were described either from late Tertiary or Recent faunas. However, *Protamnicola* is distinguished by a thinner inner lip and distinct umbilical fissure in combination with its naticoid outline.

Protamnicola naticoides new species Fig. 6.

Shell naticoid in outline, of thin substance. The spire is about one-third of the shell altitude. Other features those of the genus.

Altitude of shell, 9.0 mm.; width of shell, 8.0; height of aperture, 6.2; width of aperture, 5.5; number of whorls, 5.0.

Holotype, U. S. Nat. Mus., 103928.

A number of rissoid species from Cretaceous formations of North America have been described as *Hydrobia* Hartmann or *Amnicola* Gould and

Hartmann, but none of those species has a gibbous body whorl in contrast with a low spire and well-thickened inner lip margin.

Two very young specimens seem to belong to this species. One of them has its inner lip margin well preserved, while another has its parietal wal injured.

STANTONOGYRA new genus

Shell umbilicate, of median size, ovately oblong in outline, with an elevated spire and descending body whorl. Whorls well convex, rapidly increasing in size, bearing well-developed spiral carinae and distinct growth lines. Aperture broadly ovate, having its peristome continuous; outer lip thin, slightly retreating above; parietal margin well defined, more or less thickened, and columellar lip somewhat arched.

Genotype.—*Goniobasis? silberlingi* Stanton.

The genus is characterized by its well-developed peristomal margin, rather prominent umbilical pit, and spiral sculpture. Its general outline and sculpture resemble *Cosinia* Stache, which was described from an Upper Cretaceous fauna in Europe, but *Stantonogyra* is readily distinguished by the conspicuous absence of an interior notch.

In describing *G.? silberlingi* on the basis of a single, imperfect specimen, Dr. T. W. Stanton, after whom the present genus is named, recognized its difference from the genus to which it was provisionally assigned.

Stantonogyra silberlingi (Stanton) Fig. 7.

Goniobasis ? silberlingi Stanton, Proc. Am. Philos. Soc., vol. 42, p. 198, pl. 4, fig 4, 1903.

The present lot contains a series of specimens representing shells of various developmental stages, ranging in size from an altitude of 6.2 mm. and width of 5.0 with 4 whorls to an altitude of 13.0 + and width of 10.0, with 4 to 6 whorls (apical part injured). A small specimen with its last two whorls preserved measures 7.2 in altitude and 7.2 in width.

Figured specimen, U. S. Nat. Mus., 103930. Unfigured specimens, A. N. S. P., 16806.

These specimens are undoubtedly identical with Stanton's species, which was described from the Kootenai formation in Montana.

Charydrobia cretacea new species Fig. 8.

Shell narrowly perforate, ovately oblong in outline, of median size for the genus. Spire high with a side angle of about 37° and proportionately dilated body whorl. Whorls 5 to 6, gradually increasing in size. Surface gently convex and bearing fine but distinct lines of growth, traceable on better preserved part of the shell. Aperture of subovate form, peristome thin and appearing to be continuous, outer lip retreating at upper part and moderately produced at the base, parietal margin thin but defined, columella short and slightly reflected. Measurements (in millimeters) of two specimens are as follows:

Altitude of shell, 7.6, 7.0; width, 3.8, 3.8; height of aperture, 3.0, 3.0; width, 2.2, 2.2; number of whorls, 6.0, 6.0.

Holotype, U. S. Nat. Mus., 103933. Unfigured paratypes, A. N. S. P., 16807.

This species differs from *Charydrobia stachei* White, described from the Bear River formation at a locality near the mouth of Sulphur Creek in western Wyoming, by its smaller size, more slender outline, and less convex whorls.

Charydrobia Stache (Stache, Guido, Die liburnische Stufe und deren Grenz-Horizonte: Abh. K. k. geol. Reichsanstalt, Band 13, p. 147, 1889) was originally described for a number of rissoid species from Upper Cretaceous formations in southeastern Europe.

VIVIPARIDAE

Lioplacodes cretaceus (Stanton) Fig. 10.

Amnicola ? cretacea Stanton, Mon. 32, U. S. Geol. Survey, p. 633, pl. 75, fig. 8, 1899.

A number of examples agree well with this species, described from the "Dakota" (now known to be the Lower Cretaceous Kootenai formation) of Yellowstone Park. A few median-sized specimens in the lot are identical with the type. The largest example, with its last four whorls preserved, measures 17.5 mm. in altitude of shell, 11.0 in width, 8.2 in height of aperture and 6.8 in width.

Figured specimen, U. S. Nat. Mus. 103934. Unfigured specimens A. N. S. P., 16808.

Lioplacodes convexiculis new species Figs. 9, 9b.

Shell narrowly perforate, conically ovate in outline, with a side angle of about 45°. The spire constitutes three-fifths of the entire shell and the body whorl is rapidly dilated, descending in front, obscurely angulated along the periphery. Whorls 5 to 8, early ones gradually, and later ones rapidly, increasing in size, strongly convex, and bearing strong lines of growth, which become costulate on the body whorl of the matured specimens. Occasional strong rib lines over the later whorls indicate the former peristomal margins. Aperture pyriform, the peristome continuous and thickened within, outer lip retreating at its upper part, slightly produced anteriorly, inner lip more or less arched, and columella obliquely straight. Measurements (in millimeters) of three specimens are as follows:

Altitude of shell, 11.5+, 11.5+, 9.0; width, 9.8, 6.5, 5.0; height of aperture, 8.0, 6.0, 4.0; width, 5.5, 4.1, 2.6; number of whorls, 5.0+, 6.0+, 6.0.

Holotype, U. S. Nat. Mus., 103936. Unfigured paratypes, A. N. S. P. 16809.

Lioplacodes convexiculis differs from *L. veternus* and *L. cretaceus* by its more exserted apex, rapidly tapering spire, and more distad body whorl. Its early whorls increase more gradually in size and have a more strongly convex surface.

ELLOBIIDAE

Tortacella cf. **T. haldemani** (White) Fig. 11.

Acella haldemani White, Bull. U. S Geol. and Geog. Survey Terr., vol 4, p. 714, 1878.
Tortacella haldemani White, Bull. 128, U. S. Geol. Survey, p 44, pl. 5, figs. 8-12, 1895.

The specimens of the present lot seem to agree in size, general outline, and sculpture with this species, described from the Bear River formation. Its specific identity cannot be determined with certainty, since the examples on hand do not clearly show the columellar folds.

Figured specimen, U. S. Nat. Mus., 103939. Unfigured specimen, A. N. S. P., 16810.

PLANORBIDAE

Gyraulus sp. undet.

Two immature examples in the present lot seem to represent a species of *Gyraulus* having a sunken apex, rapidly increasing whorls, and obtusely angulated basal margin.

LYMNAEIDAE

Lymnaea sagensis new species Fig. 12.

Shell ovately globose in outline, of thin substance, with a conically elevated spire and ventricose, descending body whorl. The spire is about one-sixth the length of the body whorl. Whorls 4 to 5, rapidly increasing in size. Surface of early whorls gently convex, last one roundly convex and bearing distinct growth lines. Suture well impressed. Aperture subovate, outer lip thin, simple, parietal margin spreading, columella short, obliquely straight, slightly reflected, and covering the narrowly perforate umbilicus. Measurements (in millimeters) of three specimens are as follows:

Altitude of shell, 12.0, 9.6, 8.0; width, 9.0, 6.2, 6.0; height of aperture, 7.2, 6.0, 5.4; width, 5.2, 4.2, 4.0; number of whorls, 5.0, 4.3, 4.0.

Holotype, U. S. Nat. Mus., 103941. Unfigured paratypes, A. N. S. P., 16811.

This species is described as *Lymnaea* s. l. because its columellar characters are not well preserved in these specimens. It differs from *Limnaea* *hopii* Robinson, described from the " Painted Desert beds " of northeastern Arizona, by its shorter spire and thinner inner lip margin. It differs from *Limnaea nitidula* (Meek), of the Bear River formation, by its much broader outline and lower spire.

PHYSIDAE

Physa cf **P. walcotti** Yen and Reeside Fig. 13.

Physa walcotti Yen and Reeside, Jour Paleont, vol 20, no 1, p. 57, 1946

Two specimens are contained in this collection that differ from *P. walcotti* by their smaller size, stouter outline, and lower spire. The larger example measures 3.2 mm. in altitude, 2.0 in width, and has 4⅓ whorls.

Figured specimen, U. S. Nat. Mus., 103943. Unfigured specimen, A. N. S. P., 16812.

BIBLIOGRAPHY

CLARK, W. B. 1911 Systematic paleontology. Lower Cretaceous Mollusca· Maryland Geol. Survey, pp. 211-213.

MACNEIL, F S. 1939. Fresh-water invertebrates and land plants of Cretaceous age from Eureka, Nevada. Jour. Paleontology, vol. 13, no. 3, pp 355-380, 1 pl.

McLEARN, F H. 1929. Cretaceous invertebrates, in Mesozoic palaeontology of Blairmore region, Alberta Bull 58, geol. ser. 50, Nat. Mus. Canada, pp. 73-79, 7 pls.

McLEARN, F. H. 1945 Revision of the Lower Cretaceous of the western interior of Canada· Canada Geol Survey Paper, 44-17 (2d ed.), 14 pp., 12 pls., 2 charts.

ROBINSON, W. I 1915. Two fresh-water gastropods from the Mesozoic of Arizona: Am. Jour. Sci., 4th ser., vol 40, pp. 649-651.

RUSSELL, L S. 1932. Mollusca from the McMurray formation of northern Alberta: Trans. Royal Soc Canada, 3d ser, vol. 26, sec. 4, pp. 121-156.

STANTON, T. W. 1899. Mesozoic fossils of the Yellowstone National Park: Mon. 32, U. S. Geol. Survey, pt. 2, pp. 600-650.

STANTON, T. W. 1903. A new fresh-water molluscan faunule from the Cretaceous of Montana: Proc. Am. Philos Soc., vol. 42, pp. 188-199, 1 pl

WALCOTT, C. D. 1884 Paleontology of the Eureka district: Mon. 8, U S. Geol. Survey.

WHITE, C. A. 1878. Paleontological papers, No 6, Descriptions of new species of invertebrate fossils from the Laramie group: Bull. 4. U. S. Geol. and Geog Survey Terr., pp. 707-719.

WHITE, C. A. 1895. The Bear River formation and its characteristic fauna: Bull. 128, U. S. Geol. Survey.

YEN, TENG-CHIEN, and REESIDE, JOHN B., JR 1946. Freshwater mollusks from the Morrison formation (Jurassic): Jour. Palaeontology, vol. 20, no. 1, pp. 52-58, 1 pl

NOTULAE NATURAE

NUMBER 167 OF FEBRUARY 20, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

COLOMBIAN ZOOLOGICAL SURVEY. PART IV.*—FURTHER NOTES ON COLOMBIAN BIRDS, WITH THE DESCRIPTION OF NEW FORMS

BY RODOLPHE MEYER DE SCHAUENSEE

Curator of Birds, The Academy of Natural Sciences of Philadelphia

This paper contains notes on Coerebidae, Parulidae and Icteridae, the descriptions of new forms of *Dacnis cyana, Conirostrum albifrons, Basileuterus luteoviridis* and, I believe, establishes the validity of the virtually unknown species *Gymnostinops cassini*, Richmond.

Funds for the Colombian collections have been provided by the American Philosophical Society, Charles M. B. Cadwalader and the writer.

I acknowledge with thanks the loan of specimens of *Basileuterus richardsoni* kindly lent me by Dr. J. T. Zimmer of the American Museum of Natural History.

Chlorophanes spiza arguta Bangs and Barbour

A study of our series of *Chlorophanes spiza* shows that four forms inhabit Colombia. As the distribution of this bird has not been well known in that country, an outline of the ranges of the various forms is here presented.

Arguta occupies the Pacific coast of Colombia from the Panama border south at least to the headwaters of the Atrato. It has not previously been recorded from Colombia. Birds from the headwaters of the Atrato, and from Nuquí on the west slope of the Baudó Mountains are bluer than the average of birds from Juradó.

---

* See footnote Not. Nat. no. 161, p. 1.

Chlorophanes spiza subtropicalis Todd

This form occupies the subtropical zone of the Western Andes and the west slope of the Central Andes. The females differ strikingly from those of the other forms by having the throat yellow, and the under part flammulated with yellow.

Chlorophanes spiza caerulescens Cassin

This form is found in Colombia, on the eastern slope of the Eastern Andes, and in the region of the headwaters of the Magdalena Valley, where it becomes somewhat intermediate in the direction of *subtropicalis*.

Birds from El Tambor, Santander, western slope of the Eastern Andes, are closest to *caerulescens*. Females are indistinguishable but males average considerably less blue, more like *spiza* or *arguta* in color. The extent of yellow on the commissure is carried well forward, more so than in typical *caerulescens*, more as in *arguta*. They are intermediate between the two forms.

Chlorophanes spiza exsul Berlepsch and Taczanowski

According to Chapman (Bull. Amer. Mus. Nat. Hist., 1917, p. 586), this form is found in Colombia from the lower reaches of the Río San José southward. We have a single female from La Costa which agrees fairly well with females of *exsul*, with the exception of having the belly somewhat yellowish.

Males of *exsul* are easily distinguishable from those of any other race by the greenness of their plumage which lacks virtually any trace of blue.

Hellmayr, commenting on birds from Nóvita and Noanamá, states that they are close to *exsul* but slightly bluer below. He calls them *exsul*. (Proc. Zool. Soc., 1911, p. 1096.)

Material examined.—Chlorophanes spiza spiza, FRENCH GUIANA: 2 ♂, 2 ♀. DUTCH GUIANA: ♂. BRITISH GUIANA: ♀. TRINIDAD: ♂. VENEZUELA: Cariaquito, 5 ♂, 4 ♀. BRAZIL: Belém (Pará), 2 ♂, 1 ♀.

Chlorophanes spiza caerulescens, BOLIVIA: (type), Yuracarés, ♂; Todos Santos, ♂; Teoponte, ♂; Huanay, ♂; Chiñiri, 2 ♂. PERU: Chanchamayo, 2 ♂; Puerto Yessup, 2 ♂, 3 ♀; Moyobamba, ♂, 2 ♀. ECUADOR: mouth of the Curaray, ♂. COLOMBIA: La Morelia, 3 ♂, 2 ♀; San Agustín, ♂, 2 ♀; El Isno ♀; "Bogotá", ♂; El Tambor, 4 ♂, 2 ♀.

Chlorophanes spiza exsul, ECUADOR: Bucay, 4 ♂, ♀; Río de Oro, ♂. COLOMBIA: La Costa, ♀.

Chlorophanes spiza arguta, COLOMBIA: Juradó, 28 ♂, 18 ♀; headwaters of the Atrato, ♂; Río Jurubidá, 2 ♂, ♀. PANAMA: Mt. Sapo, 8 ♂, ♀; Gatún, ♀; Boquete, ♂. COSTA RICA: Boruca, ♀; Pozo Azul, ♂.

Chlorophanes spiza guatemalensis, PANAMA: Fruitdale, 2 ♂. NICARAGUA: Eden, 2 ♂, 3 ♀; Bluefields, 2 ♂.

Two males from Fruitdale, northeast coast of Panama, could not possibly be called *arguta*. Their bills measure 16 and 17.5 mm., as against 13, 13.5, 13.5, 14 and 14.5 for males from Mt. Sapo, and 14 mm. for a male from Boquete. Bills of four males of *guatemalensis* measure 15.5, 15.5, 16 and 16.5 mm. Neither Griscom in his list of birds from Panama, nor Hellmayr in Birds of the Americas, records this form from Panama, but the two Fruitdale birds agree so closely with specimens of *guatemalensis*, both in color and in length and thickness of bill, that it would appear this form may stretch further southward along the Caribbean coast than has heretofore been supposed.

Cyanerpes lucidus isthmicus Bangs

The fact that this bird occurs with *Cyanerpes caeruleus chocoanus* at Juradó, shows that *lucidus* must be kept as a distinct species.

Females are easily told from those of *chocoanus* by the blue wash on the crown, the almost white throat and center of the abdomen.

This species has not been recorded previously from Colombia.

Dacnis cyana ultramarina Lawrence

A series of 15 birds from Juradó agrees perfectly with this form.

Dacnis cyana baudoana new subspecies

TYPE.—♂ ad., A. N. S. P., no. 146894, collected at the Río Baudó, Chocó, Colombia, by Kjell von Sneidern on January 8, 1940.

Description.—Intermediate in color between *Dacnis cyana coerebicolor* Sclater, of Bogotá, and *Dacnis cyana ultramarina* Lawrence, of Lion Hill, Panama. When seen with *ultramarina, baudoana* looks purplish blue, but when held with *coerebicolor* it looks blue with little purplish tinge.

Measurements of type.—Wing 65 mm., tail 40, culmen 9.

Range.—Known from the Pacific slope of the Baudó Mountains.

Material examined.—*Dacnis cyana ultramarina*, 14 ♂, Juradó, Colombia; Gatún, Garachiné, Panama; Eden, Bluefields, Nicaragua.

Dacnis c. coerebicolor, 3 ♂, Bogotá, 1 ♂, El Tambor, Santander.

Dacnis c. napaea from Santa Marta is intermediate in color, but purplish, thus closer to *coerebicolor*.

Dacnis viguieri Salvin and Godman

The type of this very distinct species was collected by Dr. Viguier in 1877, supposedly on the shores of the Gulf of Darien. Since its description no more specimens had been seen and so it came as a considerable surprise that von Sneidern found this seemingly very rare bird to be abundant in extreme northwestern Colombia where he collected the incredible number of forty specimens, at Juradó and Río Salaquí.

There can be no doubt that although common where it is found, the species is very local, for von Sneidern informs me he did not encounter this beautiful species in other parts of western Colombia.

It is interesting to note that *Dacnis venusta fuliginata* is also very common at Juradó, in the same type of country as *D. viguieri;* von Sneidern secured 41 specimens at Juradó, and only five farther south at the headwaters of the Atrato. That Juradó must be an exceptionally suitable environment for sugar birds is further attested to by the fact that out of 63 specimens of *Chlorophanes spiza* collected in all parts of Colombia, from the east base of the East Andes to the Pacific coast, 46 specimens were secured at Juradó.

The males of *viguieri*, like those of *Tersina viridis,* are blue when held toward the light, green when held away from it. The iris is noted as " yellow " and " light yellow," the upper mandible black, the lower gray with black tip, the feet and legs blue-gray.

The female, which has not been described before, is closest in color to *Dacnis l. lineata* but much greener above and more olive below. It can be described as follows:

Upper surface Cerro Green *, upper tail-coverts tinged with blue; sides of body Oil Green, chest somewhat yellower; center of abdomen and under tail-coverts Colonial Buff; primaries blackish brown, secondaries edged with Parrot Green, wing-coverts Parrot Green with a strong golden sheen when held against the light; rectrices blackish brown, the central ones edged with Parrot Green. Iris yellow, culmen black, mandible blue-gray with black tip, feet blue-gray.

Immature males resemble females, but the upper surface is of a slightly bluer shade of green.

Thirteen adult males measure as follows: wing 58-61 mm., tail 35-38, exposed culmen 10-11.5.

---

* Colors in capitals are from Ridgway's " Color Standards."

Seventeen adult females measure: wing 56-60.5 mm., tail 36-39.5, exposed culmen 10-12.

Conirostrum albifrons centralandium new subspecies

TYPE.—♂ ad., A. N. S. P., no. 154175, collected at Laguneta (7000 ft.), Caldas, west slope of the Central Andes, Colombia, by Kjell von Sneidern on March 30, 1942.

Description.—Distinguished readily from *Conirostrum albifrons albifrons* Lafresnaye of Bogotá and the Eastern Andes by having the entire under surface from chin to vent dull bluish black instead of violet, the under tail-coverts brighter and more glossy blue. Tibial feathers blackish, not white. Crown pure white in 50 per cent of the specimens examined, in the other 50 percent with a few blue feathers mixed with the white ones. Dorsal surface bluer, and the rump brighter, more glossy than in the nominate form. From *C. albifrons atrocyaneum* Lafresnaye this new form can be readily distinguished by its white instead of blue crown.

Measurements of type.—Wing 79 mm., tail 64, culmen 11.

Range.—Known only from the Central Andes, both slopes, in the region about Laguneta, Toché, and from San Agustín and La Candela at the head of the Magdalena.

Material examined.—*Conirostrum albifrons albifrons,* 3 ♂, 3 ♀, Bogotá; 5 ♂, 2 ♀, Ramirez, Santander; ♀, La Pica, Santander.

Conirostrum albifrons centralandium, 8 ♂, 6 ♀, Laguneta; 2 ♂, ♀, Toché; 2 ♂, 2 ♀, La Candela; ♀, San Agustín.

Conirostrum albifrons atrocyaneum, ♂, San Antonio; 3 ♂, Munchique; 2 ♂, Mayasquer.

Remarks.—This very interesting form bridges the gap between the white crowned *albifrons* and the blue crowned *atrocyaneum.* Its body plumage is close to the latter, including the dark instead of white tibia, but the crown is white as in *albifrons.* In some specimens a few blue feathers mixed with the white ones show the Central Andean birds to be verging toward the blue crowned West Andean subspecies.

From its geographic position, the intermediate characters shown by this new form are not unexpected, but it is interesting to find this connectant between two very different-appearing birds.

PARULIDAE

Mniotilta varia (Linnaeus)

Taken in Colombia October (7th),[1] November, February, March (22nd).

---

[1] Numbers in parenthesis indicate earliest and latest dates of collection.

A male taken on the latter date has the black throat of the breeding plumage.

Pronotaria citrea (Boddaert)

Our specimens were taken in September (27th) and November (23rd).

Vermivora peregrina (Wilson)

Three specimens from western Colombia taken in October (18th) and February (27th).

Dendroica aestiva aestiva (Gmelin)

A series taken September (17th), October and November (24th), both on the Pacific coast and in the Caquetá.

Dendroica fusca (Müller)

A large series taken during each month from October (16th) until May (13th).

Males are in full breeding plumage February 2nd. All the specimens are from the Cauca, and Magdalena Valleys, Nariño and Santa Marta.

Dendroica castanea (Wilson)

A series was taken on the Pacific coast lowlands from November 9th to 17th.

Dendroica striata (Forster)

Secured only at La Morelia in the Caquetá region October 5th to November 22nd.

Seiurus noveboracensis notabilis Ridgway

Specimens were taken on the Pacific coast, Cauca Valley, "Bogotá," La Morelia, and the Santa Marta region during September (17th), October, November, December, January, and April (23rd).

Oporornis philadelphia (Wilson)

Secured on the Pacific coast, the Cauca Valley and Belén, Caquetá, during October (11th), November and December (19th).

Geothlypis trichas trichas (Linnaeus)

A single specimen (♂) was taken on the slopes of the Baudó Mountains (3000 ft.), above the Río Jurubidá, on the extraordinarily late date of June 16!

The only other South American record that I know of, is a specimen secured at Lake Macotama, Colombia, April 12, by M. A. Carriker, Jr.

Geothlypis semiflava bairdi Watling

A series of 12 specimens from Nuquí and Ricaurte do not agree with series of the typical form from Bucay, western Ecuador. They are darker on the back, and have olivaceous sides and are, in fact, so close to specimens of *bairdi* from Almirante and Changuinola, Panama, that they must go by that name. The only difference between them and *bairdi* is that the Colombian birds have the back a trifle lighter, but this difference is inconsequential.

The typical form is apparently restricted to Western Ecuador.

Wilsonia canadensis (Linnaeus)

A series was taken during September (29), October, November, December, February, March and April (28), at Juradó, Toché, Ricaurte, Perlasiví, Río Munchique, Laguneta and La Morelia.

Setophaga ruticilla (Linneaus)

Specimens from El Tambo, Munchique, Río Patia, Ricaurte, La Morelia, and Santa Marta taken during September (14), October, November, March, and April (8).

Myioborus melanocephalus ruficoronatus (Kaup)

The chestnut crowned *Myioborus* described by Kaup as *ruficoronatus* is a rare and little known bird and has been considered by ornithologists to represent a distinct species, differing from *melanocephalus,* and particularly the race *bairdi* (Salvin), with which it occurs, chiefly by having the forehead and ocular region yellow instead of black. I believe, however, that *ruficoronatus* represents the extreme of variation of *bairdi,* and that *bairdi* being the more recently proposed name, should be suppressed.

A series of this bird from southwestern Colombia appears to support this view.

A single specimen secured on Chiles at 11,100 feet is typical of the yellow fronted *ruficoronatus.* Four birds taken on Chiles at the same altitude are intermediate between it and *bairdi,* and indeed one is so close to *ruficoronatus* that it differs from it only by having the rufous of the crown bordered laterally by black. Fourteen specimens taken at a lower altitude (7800 ft.), are, all except one, typical of *bairdi,* the exceptional one differing by having a considerable amount of yellow on the forehead.

Chapman (Bull. Amer. Mus. Nat. Hist., LV, 1926, p. 598) records specimens of *bairdi* from Ecuador which approached *ruficoronatus* in the colors of the head markings.

As to a character by which *ruficoronatus* may be distinguished from *bairdi* Hellmayr (Bds. Amer., pt. VIII, p. 470) says " Aside from its larger size," etc. There is, however, no size difference between the two, and as a matter of fact Salvin (Ibis, 1878) gives a larger wing measurement for *bairdi* (2.5 inches, p. 317) than he does for *ruficoronatus* (2.3 inches, p. 316). Our series measure as follows: *ruficoronatus*, wings, ♂ Chiles (11,100 ft.) 66.5 mm, two others in the Academy's collection marked " ♂, South America," 67, 69.5 mm.; " *bairdi*," 3 ♂ Chiles 11,100 ft., 69, 70, 70 mm.; 8 ♂, Mayasquer (7800 ft.) wings, 67 (2), 68, 69 (3), 69.5, 71 mm.

It is significant that the supposed species, *ruficoronatus*, is known only from the same region in southwestern Colombia and western Ecuador, in which *bairdi* occurs.

Basileuterus nigro-cristatus nigro-cristatus (Lafresnaye)

Birds from Ecuador and Nariño appear brighter and more golden yellow below and average smaller than birds from more northern localities in Colombia. Specimens from La Pica, Peña Blanca, Laguneta, Toché and Sancudo have wings measuring in males 65, 67, 67, 67, 67.5, 67.5 mm.; in females 55, 57, 60.5 mm. as against 58, 59.5, 60.5, 60.5, 61, 64, 64, 64 mm. in males and 57, 57, 58.5 in females from western Ecuador and Nariño.

Hellmayr has seen much more material than I have and comes to the conclusion that *B. meridionalis* Pelzeln described from Ecuador is best not revived.

Basileuterus luteoviridis quindianus new subspecies

TYPE.—♂ ad., A.N.S.P. no. 154295, taken at Laguneta (10,000 ft.), Caldas, western slope of the Central Andes of Colombia, collected by Kjell von Sneidern, on April 9th, 1942.

Description.—Close to *B. l. luteoviridis* (Bonaparte) but lower parts on the average more clouded with olive, upper surface averaging darker, less yellowish green. Eyebrow streak white, tinged with yellow, instead of bright golden yellow, sub-ocular region, chin and throat more markedly white.

Differs from *B. l. richardsoni* Chapman by much brighter green upper parts, eyebrow somewhat more tinged with yellow.

Measurements of type.—Wing 74 mm., tail 67, culmen 9.5.

Range.—Both slopes of the Central Andes in the region of Laguneta and Toché.

Material examined.—*Basileuterus l. luteoviridis*, o, " Bogotá "; o, Fómeque; ♂, Subia, Eastern Andes; ♂, Almagur, Central Andes of Colombia. 3 o, Río Upano, eastern Ecuador. o, no locality.

Basileuterus l. quindianus, ♂ Laguneta (the type), ♂ Laguneta, western slope of the Central Andes; ♂ ?, 3 ♀, Toché, eastern slope of the Central Andes of Colombia.

Basileuterus l. richardsoni, o, 2 ♀, coast range west of Popayán, Western Andes.

Remarks.—The relationship between *B. richardsoni* and *B. luteoviridis* has remained, since the description of the former, rather puzzling, chiefly due to lack of specimens. The receipt of birds intermediate between these two supposed species leads one to the conclusion that *richardsoni* must be regarded as a very distinct and isolated form.

That both *richardsoni* and *quindianus* are of very restricted distribution is evident. The former is known only from the vicinity of Cerro Munchique, and the latter only from the Quindio Pass region.

The fact that *luteoviridis* was taken at Almaguer at the headwaters of the Río Patia led Chapman to believe that *richardsoni* would have to be regarded as a full species, although admittedly close to *luteoviridis.*

I believe that the rather peculiar distribution of the Colombian forms of this warbler may be explained as follows: *luteoviridis* inhabits the Eastern Andes, extending to the Central Andes at their southern extremity where the two mountain ranges form the headwaters of the Patia on the south and Magdalena on the north, thence passing southward into Ecuador thus probably inhabiting the high mountains of Nariño. Isolated at the southern end of the Western Andes (no specimens were taken by the American Musemum at Paramillo) is *richardsoni,* and again isolated at the northern end of the Central Andes (both slopes, Sancudo, Salento, Toché) is the intermediate *quindianus.*

The latter in general color is very close to *luteoviridis,* but preserving the characters of *richardsoni* in the whitish eyebrow, subocular region, chin and throat.

Although two of the specimens of *richardsoni* are in very worn plumage, A.M.N.H. no. 109967 is fresh enough to be comparable with our specimens of *quindianus.* It is very dull and drab in coloration when compared with Central Andean birds, showing them to be, while intermediate, much closer to the nominate form.

Todd (Proc. U. S. Nat. Mus., 74, 1938, pp. 48-49) believes in the close relationship between *richardsoni* and *signatus,* especially its subspecies *flavovirens,* but this species has distinct black lines bordering the upper edge of the superciliaries which join on the forehead, a character not seen in *richardsoni, quidianus* or *luteoviridis.* Further, the above mentioned three are about equal in size and have bills of the same form, while *signatus* is somewhat smaller and has a wider and blunter bill.

Basileuterus coronatus elatus Todd

Fourteen specimens from Nariño agree closely with eight from western Ecuador. They are a trifle greener on the back, thus showing their geographically intermediate position between *elatus* and *regulus,* of which 42 specimens have been examined.

Regulus extends southward to Munchique, *elatus* being found only in Nariño. It has not previously been recorded from Colombia.

ICTERIDAE

Gymnostinops cassini Richmond

Since recording the capture of a female of this virtually unknown species in the Proceedings of the Academy (vol. XCIII, p. 322, 1941), another specimen, probably a male, has been sent by Mr. von Sneidern. It agrees exactly in coloration with the first specimen received. Known only from the type from the Río Truando, our two specimens help to establish the validity of the species.

As remarked by Hellmayr, *cassini* in a way is intermediate between *montezuma* and *guatimozinus.* It resembles *montezuma* in having the remiges edged with chestnut, and in having the black of the underparts and head brownish black instead of blue-black, and in having comparatively short upper tail-coverts. It resembles *guatimozinus* in having only the tip of the bill pale in color, in having the central rectrices black instead of brownish black, in having the mantle maroon instead of chestnut and in having a long, filiform crest.

It differs from both by its stouter bill, which is more expanded posteriorly, and in having the flanks maroon with the center of the abdomen black, and by its shorter tail.

Measurements in millimeters of a pair of each species under discussion

Species	*Sex*	*Wing*	*Tail*	*Culmen*	*Width of "Casque"*
cassini	♂ ?	227	167	67	18
guatimozinus	♂	259	199	68	15
montezuma	♂	264	203	79	15
cassini	♀	207	151	65.5	16
guatimozinus	♀	207.5	163	56	12.5
montezuma	♀	205	160	58	11

Gymnostinops cassini appears to be a perfectly distinct species probably confined to the west coast of Colombia, where in the northern portion it occurs with *guatimozinus*.

Xanthornus decumanus melanterus Todd

Although this race has been questioned, I believe it to be valid without peradventure of doubt.

Eighteen specimens from the Río Guali, near Honda; Río Combeima, Tolima; El Zapote, Bolivar; La Tigrera, Santa Marta; La Plata, San Agustín, Huila; El Tambo, Cauca; Río Salaquí, Chocó; and Garachiné, Darien; are at once separable from an equal number of specimens from east of the Andes by their far less purplish, more black-green coloration.

Xanthornus angustifrons angustifrons (Spix)

Specimens from La Morelia are typical of this form. A bird from Villavicencio agrees with them. One shows an interesting variation in having the frontal area buff, in shape like the yellow forehead on the related forms. Another specimen, from La Morelia has the upper mandible spotted with white, the lower distally white. The bill has been noted as "black with white spots." These variations clearly show the connection between black-billed *angustifrons* and the pale-billed forms.

Xanthornus angustifrons salmoni Sclater

This form extends southward in the Western Andes at least to La Costa and the region about Munchique, without showing any approach toward the lighter colored *atrocastaneus*.

Nariño, however, must be the meeting place of the two races for a male from Ricaurte is typical of *salmoni* while a female agrees exactly with specimens of *atrocastaneus* from western Ecuador.

Xanthornus angustifrons sincipitalis Cabanis

A single male from La Candela is very puzzling. It is closest to five specimens of *sincipitalis* from "Bogotá" in having a large area of yellow on the forehead, which is produced backward well beyond the eyes. It is considerably darker green, however, than our "Bogotá" specimens. This record extends the range of *sincipitalis* far to the southward if the specimen really represents this race. Chapman (Bull. Amer. Mus. Nat. Hist., 36, 1917, p. 626) records two specimens from below Andalucia, (5000 ft.) near the summit of the Eastern Andes, presumably on the eastern slope of that range," as having the frontal band even narrower than *neglectus*."

These perhaps are intergrades between *angustifrons* and *sincipitalis*. From still lower down, above Florencia (2500 ft.), on the east slope of the East Andes Chapman (l. c., p. 627) records a bird resembling *angustifrons* in coloration, but with a pale bill. Large series from this region, and from various altitudes would probably show complete intergradation between the black-billed, *angustifrons* with dark forehead, and the pale-billed type with yellow forehead.

Molothrus bonariensis subspecies

Von Sneidern secured an adult and a juvenile male of the Shiny Cowbird at Belén and La Morelia. It has not been recorded previously from Amazonian Colombia.

The adult has a wing of 114 mm. and thus agrees in size with both *venezuelensis* and *bonariensis*. The bill, however, is more swollen basally than in specimens of *bonariensis*. *Venezuelensis*, which I have not seen, is said to have a more slender bill than *bonariensis*. In shape the bill of the Caquetá bird is much like the bill seen in *cabanisi*, but the wing is too short for it to belong to that race. Unfortunately the tip of the bill in my adult from La Morelia is broken, therefore it cannot be measured.

Icterus chrysocephalus (Linnaeus)

This widespread species has been known in Colombia to the present, only from " Bogotá " collections. Von Sneidern secured a male at Belén, Caquetá.

Icterus chrysogaster giraudii Cassin

Lowland specimens seem a trifle smaller than those from higher elevations. Birds from Juradó measure, ♂, 92, 93, 94 mm., approaching in size *I. hondae*, Chapman. In color, however, they are not orange, but yellow as in typical *giraudii*. Birds from higher elevations are somewhat larger. They measure Bogotá (type), ♂, 103.5 mm., El Cauca ♂ 100, 102.5,103 mm., ♀ 95.5, 95.5, 96, 97; La Palmita ♂ 102.5, La Candela (5000 ft.) ♂ 102.5, ♀ 98, 98.5; San Agustín (5400 ft.) ♂ 102.5; Toché (6800 ft.) ♂ 96, 97.5, 99; Munchique (5100 ft.) ♂ 102, 105 mm.

I have examined Chapman's two original specimens of *hondae* (wing 90 mm.) and they are more orange than any specimens collected by von Sneidern. One cannot help wondering whether they are not abnormally bright. Perhaps the specimens here recorded from Juradó should be referred to *hondae* which could be regarded as a small lowland race of *giraudii*. More specimens from the vicinity of Honda will settle the question.

Sturnella magna meridionalis Sclater

A most interesting record is the extension southward of the range of this form to the head of the Magdalena Valley at La Candela and San Augustín where von Sneidern secured fourteen specimens. They mark the southernmost point at which the species has been taken in Colombia.

Compared with eleven specimens of *meridionalis* from Bogotá, Choachí, Ocaña, Peña Blanca and Villavicencio, the upper Magdalena birds have the flanks on the average more rufescent, and have a little more white on the third and fourth rectrix, but the difference between the two populations is very slight. The species has not been taken at any locality between Bogotá and La Candela and, in fact, has not been recorded from the Central Andes.

NOTULAE NATURAE

NUMBER 168 OF FEBRUARY 25, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON THE ANATOMY OF AUSTRALIAN AND GALÁPAGOS BULIMULIDAE (MOLLUSCA, PULMONATA)

BY HENRY A. PILSBRY

In the work on North American land snails, now in course of publication, it was often necessary to examine related forms from beyond our limits. Notes on two such genera follow

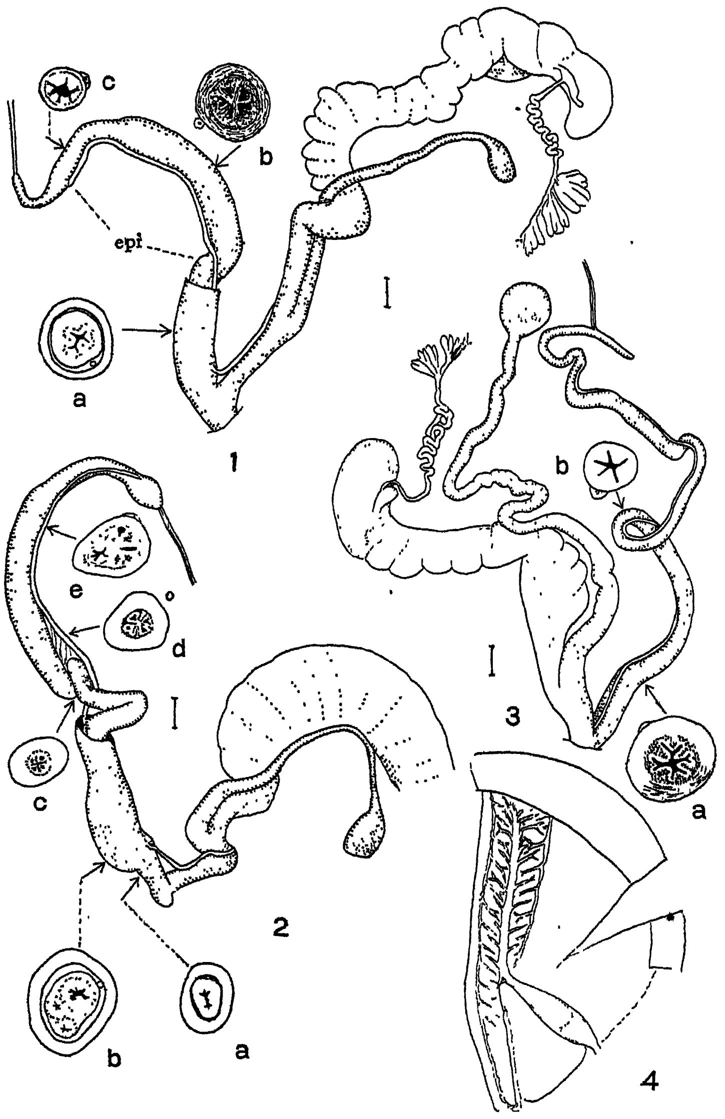
BOTHRIEMBRYON

Having occasion to state the geographic range of the Bulimulidae it was thought well to review the relationships of the Australian genus *Bothriembryon,* which the author placed in this family in 1900. Under the preoccupied name *Liparus* it had been considered a subgenus of *Buliminus* (= *Ena*) by E. von Martens, and was placed in the Helicidae by Paul Fischer. Thiele placed it between *Partula* and *Placostylus*, both of them very unlike *Bothriembryon* in structure.

The Bulimulidae seem aliens in the Australian fauna, although the Endodontidae also appear to show South American affinities.

Upon dissecting a specimen of the Australian *Bothriembryon inflatus* (Lamarck), determined and sent by my old friend Charles Hedley, I found that its organization is distinctly that of the Bulimulinae.

The pallial organs (Fig. 4), are practically like those of *Bulimulus.* The cardiac side of the triangular kidney is equal to the pericardium in length. In the lung, venation is restricted to the vicinity of the pulmonary vein.



(Explanation of figures at bottom of p. 3.)

The genitalia (Fig. 3) also are strikingly like *Bulimulus*. The globular spermatheca is on a very long duct. The penis passes without external interruption into the epiphallus, and the latter is continued in a flagellum, to which the penial retractor is attached. The vas deferens is closely bound to the very long penis + epiphallus. The only important points of difference are that the talon is very short and broad, as in some *Orthalicinae*, not finger-like as in Bulimulinae generally. The penis has no basal sheath such as is found in *Bulimulus*, but this is wanting also in various South American genera.

There appears to be no doubt that *Bothriembryon* is a bulimulid snail, agreeing with one or another of the American genera in all of the characters investigated.

I have not at this time examined the anatomy of *Placostylus;* but it is very decidedly differentiated from *Bothriembryon* and from the American bulimulid stocks, and may well form a distinct subfamily, Placostylinae. It has a short, capacious penis, a short spermathecal duct, and a more fully veined lung.

NAESIOTUS

Two species of this bulimulid group of the Galápagos Islands were examined for comparison with the North American *Rabdotus: Naesiotus unifasciatus* (Albers) from under stones on the trail southwest of Spring Peak, 180793 A. N. S. P., and *N. nux monotaenius* D & O. (? = *incrassatus* Pfr.) from the trail from Post Office Bay to Spring Peak, 180795 A. N. S. P., both on Charles Island, Galápagos, taken July 9, 1929.

In both species opened, the penis and its appendages are relatively large. The penis proper has a long sheath. Its cavity is rather small, with longitudinally ribbed wall. The long epiphallus is rather large but rather abruptly becomes more slender where the vas deferens enters, near the posterior end. The large part of the epiphallus has the cavity divided into about five ducts by irregular partitions of rather loose tissue, as in Fig. 1b.

EXPLANATION OF FIGURES

FIG. 1.—*Naesiotus unifasciatus* (Albers), genitalia. a, section midway of penis; b, c, sections of epiphallus; epi, epiphallus accompanied by vas deferens.

FIG. 2.—*Naesiotus nux monotaenius* D. & O., genitalia. Sections as indicated; at b a section of penis and its sheath, showing two accessory sacs, penis proper and vas deferens.

FIG. 3.—*Bothriembryon inflatus* (Lamarck), genitalia, with sections of penis.

FIG. 4.—*Bothriembryon inflatus* (Lamarck), pallial tract, from below.

Scale lines for figures 1, 2, 3 = 1 mm.

The outer layer of circular muscle is thick. Beyond the epiphallus there is a short, slender flagellar portion with terminal short and slender penial retractor, inserted posteriorly on the diaphragm. In *N. unifasciatus* this retractor is 2 mm. long (Fig. 1).

N. nux monotaenius differs in details of the internal structure of the epiphallus, as shown in Figs. 2, c, d. In the penis proper there are two short, cylindric sacs lying parallel to the main penis cavity, as shown in the section at b, fig. 2. These sacs are attached to the main tube of the penis near the point where the latter joins the epiphallus, and the blind ends of the sacs are in the swollen anterior part of the penis. The flagellar extension of the epiphallus is very short, broad and flattened, with terminal retractor, very slender and rather short.

In both species there is a vagina of moderate length. The ovate spermatheca is on a moderately long duct, which is shorter than in *Rabdotus,* and has no such post-median swelling as the *Rabdotus* species show.

The peculiar internal structure of the penis in *N. nux monotaenius* is unique in the family, so far as known, and differs remarkably from the simple penis of *N. unifasciatus.*

A prominent feature of *Naesiotus* is the great length of that part of the epiphallus having specialized multilocular internal structure, reaching from the contraction near the end to a point shortly above the sheath. The short flagellar part, with a terminal retractor, is similar to the structure in *Drymaeus.*

A figure of the genitalia of *N. nux* (Brod.) drawn by W. G. Binney was published by Dall and copied in Manual of Conchology 14, pl. 59, fig. 6. It differs in various details from both of the species I have dissected, though similar in general form. Evidently there is a considerable diversity in anatomical characters of *Naesiotus,* and also in the sculpture of the nuclear shell.

NOTULAE NATURAE

NUMBER 169 OF FEBRUARY 25, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

ON SOME FORMS OF PARUS MAJOR FOUND IN EASTERN AND SOUTHERN ASIA

BY RODOLPHE MEYER DE SCHAUENSEE

The only gray-backed titmouse hitherto known from Siam has been *Parus major ambiguus* Raffles, which is restricted to the peninsular portion of the country. The receipt of gray-backed specimens from central and eastern Siam, and the identification of them, has led to a review of the various forms of both the gray-backed and green-backed forms found in eastern and southern Asia, wihch bear directly on the Siamese forms.

The Gray-Backed Forms

For many years Burmese and Indo-Chinese birds have been referred to *cinereus* of Java, and Indo-China birds have also been called *hainanus* Hartert. Stresemann (Mitt. Zool. Mus., Berlin, 24, no. 2, p. 177, 1940) said he could not distinguish a series from Kwantung from *cinereus*. In 1933 Ticehurst revived the long-dormant name *nipalensis* Hodgson, for Burmese birds, showing that *caschmirensis* was a larger bird, and that Burmese specimens were not the same as those from Java, but agreed with the Nepalese examples.

As long ago as 1881 (but not published until 1888), Hume (Stray Feathers, XI) used the name *nipalensis* for birds from Manipur, Assam, Sylhet and Cachar, southward to Thatone, Tenasserim, but he did not remark on how they differed from birds from Kashmir or Java.

Upon comparison with *nipalensis* it is not surprising to find that central and eastern Siamese birds are clearly separable from them. That this should be so is not remarkable in view of the fact that they are cut off from Burmese gray-backed birds by a green-backed form inhabiting northern Siam and the Southern Shan States.

Nipalensis apparently extends southward into Tenasserim, while *ambiguus* is found in Trang. Somewhere in Tenasserim intergradation must take place. The central Siamese bird, however, is in no way intermediate between the two forms. For it I propose the name of:

Parus major templorum new subspecies

TYPE.—♂ ad., A. N. S. P. no. 114859, collected at Khao Nam Poo (over 4000 ft.), Wat Pa, (Lom Sak), about 75 miles east of Pitsanulok, central Siam, on Oct. 21, 1934, by Lucas Bah.

Description.—Closest to *P. m. nipalensis* Hodgson, but distinguishable by much more conspicuous nuchal patch, which is pure white instead of white tinged with pinkish clay-color; darker and bluer gray back, and longer tail. Gray central tail feathers with only a narrow black shaft line instead of the whole outer web black.

Instantly separable from *P. m. cinereus* Vieillot, of Java by having more white on the second rectrix (26-35 mm. vs. the usual 3-8 mm.), and from *ambiguus* Raffles, by the same character (in *ambiguus* the white on the penultimate rectrix is reduced to a small white spot), and in addition by much paler back and lower surface. Separable from *Parus major hainanus* Hartert, by much paler dorsal surface, and more conspicuous white nuchal area, and longer tail.

Measurement of type.—Wing 64, tail 62, culmen 9.5 mm. White on penultimate outer rectrix 33 mm.

Measurements of additional specimens.—6 ♂, wing 63.5-66, 2 ♀, 57, 60; tails 6 ♂, 61-63, 2 ♀, 57-64 mm.

The name *templorum* refers to the meaning of the type locality, Wat Pa, which is " temple in the forest."

The characters and measurements by which the various forms can be distinguished are given below. Only fresh specimens have been used in color comparisons, as wear considerably alters the colors.

Parus major caschmirensis Hartert

This form is separable from the other gray-backed races to the east and southeast by its larger size. The wings of 5 ♂ measure, 71-77, the tails 62-66, 2 ♀, wings 70-77, tails 60, 66; white on second rectrix 34-37 mm. (once 41 mm.).

Thirty-seven males of *nipalensis, templorum, commixtus, hainanus,* and *ambiguus,* have wings more or less alike in length which measure 59-66 mm. Fourteen females have wings of 57-65 mm.

From *nipalensis*, *caschmirensis* is separable in color by much more pinkish under surface, much wider wing band, which is pinkish instead of white, and the gray of the upper surface, especially on the upper mantle, tinged with clay-color. The name for the Kashmir form appears spelled in a variety of ways, but the original spelling is as above.

Parus major nipalensis Hodgson

The wings of three males measure 64 each, one female 60, the tails of males 50-56, female 54 mm.; white on second outermost rectrix 25-30 mm. Stresemann's measurements for the wings of this form from Burma are, 10 ♂, 64-67, 5 ♀, 61-63 (Mitt. Zool. Mus., Berlin, 24, no. 2, p. 177, 1940). Ticehurst says he cannot distinguish between birds from Nepal and those from Burma. Among his birds was one from southern Arakan (Journ. Bomb. Nat. Hist. Soc., 36, 1933, p. 921). He gives the white portion of the second outermost rectrix for *nipalensis* as 23-30 mm. Reporting on birds from northeastern India (Assam, etc.) Hume records birds from there as *nipalensis* and gives their wings as 2.55-2.35 (=64-60 mm.). He says this form extends southward to northern Pegu, Rangoon and Thatone (Stray Feathers, XI, 1888, p. 255).

Parus major templorum de Schauensee

Wings of 7 ♂, 63.5-66.5, 2 ♀, 61-63; tails of 7 ♂, 61-63; 2 ♀, 57-64 mm. White on second outermost rectrix 26-35 mm.

This form is separable from all others enumerated under *caschmirensis* by its longer tail. Color characters are given in the original description.

Parus major commixtus Swinhoe

Wings of 5 ♂, 63-66, 2 ♀, 62, 64; tails of 5 ♂, 55-58.5, 2 ♀, 54.5, 55. White on second rectrix unstable, 5-18 mm. Most have it 5-11 mm., but two from Hong Kong run up to 14 and 18 mm. A third Hong Kong specimen has the white mark 6 mm. in extent.

This form (at least those birds with pure gray backs) is difficult to separate from *cinereus* of Java. The under parts, however, are usually paler, the wing band is a little wider, and slightly shaded with pinkish, instead of dead white, and the back is not quite as pure a gray, in fact in two specimens (Goo Shan, Mirs Bay) very slightly tinged with greenish.

Parus major hainanus Hartert

6 ♂, wings 59-65.5; tails 51-57 mm. White on second outermost rectrix very unstable, 12-35 mm.

Separable from *commixtus* by paler and bluer gray back, whiter wing band; from *cinereus* by more white on the second rectrix. Close to *templorum* but back darker and tail shorter.

Parus major ambiguus (Raffles)

Wing 9 ♂, 64-67, 3 ♀, 61-63; tails, ♂, 55.5-61, ♀, 54-56 mm. White on second outermost rectrix a small white terminal spot.

This form can be distinguished from all others by having considerable black on the outermost rectrix, in fact on the inner web it runs down to, or almost to, the tip. It is also the darkest below of all the forms seen.

Parus major cinereus Vieillot

Wings, 7 ♂, 63-66, 6 ♀, 62-65; tails, ♂, 50-57, ♀, 50-57. White mark on second outermost rectrix small, 3-8 mm. Two out of the thirteen, however, have it 11 and 13 mm.

This race is somewhat paler, both above and below, than *ambiguus*, and the central tail feathers are gray instead of almost black. It also has more white on the second rectrix than *ambiguus*, but of course much less than *nipalensis* or *templorum*, and almost always less than *hainanus*.

Parus major sarawacensis Slater

Not seen, but according to its describer (Ibis, 1885, p. 122) differs from *cinereus* (and all other gray-backed forms mentioned in this paper) by having virtually no white nuchal patch, and black, instead of gray, upper tail-coverts. The plate (no. IV) shows these characters very clearly. Sclater further states, regarding the tail feathers, " the external one alone on each side marked with white, which occupies all its area, including the shaft, excepting a narrow marginal border to the inner web, which is black " (l. c. p. 122).

Mayr has kindly examined the type and writes me as follows: " It cannot possibly be confused with one of the other races. Compared with Java birds it is darker above, the black of the cap extending onto the hind neck. There is no trace of a white patch on the neck. The black breast patch appears considerably larger. The tail feathers are very blackish with only a narrow edge of dark gray. The white of the tail is restricted to the outermost tail feather, which is white on the outer web and part of the apical half on the inner web. Wing 68, tail 55."

Chasen (Hdlst. Mal. Bds., Bull. Raff. Mus., S'pore, no. 11, 1935) uses the name *cinerascens* Slater for the Borneo form, but as Slater pointed out in the Ibis (1885, p. 327) his name *cinerascens* is preoccupied by *Parus* *cinerascens* Vieillot (Nouv. Dict. d'Hist. Nat., 20, 1818, p. 325), which is regarded as the southwest African form of *Parus afer* Gm., if African birds are kept as a distinct species and not regarded as conspecific with *major.*

Specimens examined.—*Parus major caschmirensis;* ♂, Bradlu Valley, Baltistan, Kashmir, (900 ft.);[1] ♂, ♀, Sind Valley, Kashmir (6000 ft.);[1] ♂, Vale of Kashmir;[1] ♂, Skardu, Baltistan, Kashmir (7000 ft.);[1] ♂, Chungus Serai, Kashmir; ♂, Serinuggur, Kashmir. *Parus m. nipalensis;* 2 ♂, Dudaw Taung, (650 m.); ♂, ♀, Mt. Victoria (500 m.), Chinn Hills, Burma. *Parus m. templorum;* 4 ♂, 1 ♀, Chanuman; ♂, ♀, Khulu; 2 ♂, Wat Pa, eastern and central Siam. *Parus m. hainanus;* 2 ♂, Secha;[2] ♂, Lei Mui Mon;[2] 2 ♂, Liudon;[2] ♂, No Tai,[2] Hainan. *Parus m. commixtus;* ♂, Deep Bay;[1] ♂, Lamma,[1] Mirs Bay,[1] Hong Kong; ♂, ♀, Goo Shan (Foochow), Fukien;[1] ♀, Canton;[1] China. *Parus m. ambiguus;* 2 ♂, ♀, Prahmon, Trang, peninsular Siam;[1] 3 ♂, o, Blangbeke (7000 ft.); 2 ♂, Mt. Loser (79-9300 ft.); 2 ♂, 2 ♀, Blangnanga (3600 ft.); ♂, ♀, Padang Pandjang, Sumatra. *Parus m. cinereus;* 4 ♂, 4 ♀, Pelaboeau Tjibadja; 2 ♂, ♀, Darajat; ♀, Pandan Areon; ♂, ♀, Mt. Salak;[1] ♂, Tjibodas;[1] ♂, Depok;[1] ♂, Buitenzorg,[1] Java; ♂, Soenge Lujat, Banka.

The Green-backed Forms

The green-backed forms are very variable geographically in size, and on this account they have been split into innumerable races, many of which are intergrades between two other subspecies. They also vary somewhat in color, but, even more than among the gray-backed forms, specimens in fresh plumage must be compared, for worn birds in extreme cases become gray losing all trace of the green coloring. In the present review I have been careful to compare only birds in fresh plumage when dealing with color.

Parus major minor Temminck and Schlegel

Wing, 5 ♂, 64-69, tail, 60-65; ♀, wing, 65, tail, 55; 2 o, wing, 67, 68, tail, 52, 55 mm. White on second outermost rectrix 3-20 mm.

Parus major artatus Thayer and Bangs

Wings, 26 ♂, 65-73, tail, 56-64; 5 ♀, wing, 64.5-67, tail, 57-60.5 mm. White on second outermost rectrix 4-26 mm. In 17 out of 31 specimens the white area is 10 mm., or under, only four have this mark 20 mm. or over, the remaining 14 have it between 11 mm. and 19 mm. Fourteen males from Peking, Tsingtao, and Weishien, Shantung, are somewhat larger than twelve males from Kiangyin, Kiangsu, and Mokanshan, Chekiang. The former havê wings of 69 to 73 as against 67.5 to 70 mm.

---

[1] Specimens from the United States National Museum.

[2] Specimens from the American Museum of Natural History.

Perhaps these somewhat larger birds are approaching *wladiwostokensis* Kleinschmidt which I have not seen. Mayr and Birkhead give wing measurements for 7 ♂, as 71-74, tails 63.5 to 72.5; the wings of eight females 68.5 to 75.5, tails 61-67.5; *tschiliensis* Klein., described from northern Chihli, is probably an intergrade between it and *minor*.

In a paper on the birds of Jehol by Takatsukasa, Hachisuka, Kuroda, Yamashina and Uchida (Report of the First Scientific Expedition to Manchukuo, 1935) wing lengths are given 69.5-73 mm. and the specimens recorded as *artatus*.

Parus major tibetanus Hartert

Wing, 12 ♂, 73-79, tail 62-67; 9 ♀, wing 71-77, tail 58-67 mm. White on second outermost rectrix 28-51 mm., mostly 33-43 mm.

In addition to its larger size *tibetanus* is distinguishable from *artatus* by having the green of the upper surface more extensive, and the white portion of the second outermost rectrix greater in extent.

A single specimen from Tatsienlu (topotype of *subtibetanus* Kleinschmidt and Weigold) unfortunately has the two outermost tail feathers missing. In size it agrees with *tibetanus*, wing 73, tail 64 mm. Other specimens from there are recorded as having wings up to 76 mm.

A female from Lhasa has a wing of 72.5, tail 63 mm. Ludlow (Ibis, 1944, p. 67) gives the wings of 8 ♂ from southeastern Tibet (9,500-11,500 ft.) as 75-77 mm., and 3 ♀, 71-73 mm.

Parus major fohkienensis La Touche

Not seen. According to La Touche (Bds. E. China, II, 1930, p. 475) it is " darker and smaller " than *artatus*. It measures, according to the same authority (p. 476), "(12 skins) wing 61.5-69 mm., tail 51-61 mm." Meinertzhagen (Ibis, 1928, p. 532) places La Touche's form in the synonymy of *commixtus* but its describer in the addenda to his book on Eastern China birds upholds its validity. In size it only appears to average smaller than *artatus*. Whether it differs in color I cannot say, other than quote La Touche. From his remarks it apparently is a constantly green-backed form which probably is the connectant between the green-backed birds to the north and the smaller, usually gray-backed *commixtus* to the south.

Parus major kansuensis Stresemann

Not seen. This bird, from the description, forms the transition between *artatus* and *tibetanus*. It is compared to *tschiliensis;* thus in size it is like the larger, northern specimens of *artatus*, but has on the average more white in the tail, in this respect approaching *tibetanus*. Measurements given by Stresemann (Orn. Monatsb., 36, 1928, p. 41) are wing ♂, 74, ♀, 67, tail, ♂, 70, 71, ♀, 61; white on penultimate tail feathers ♂, 12, 14, 25, 27, ♀, 13, 17 mm. Yen's measurements for this form are, wing, 10 ♂, 70-77, 4 ♀, 68-77 mm. (L'Ois., 1934, p. 311).

This form has been synonymized with *wladivostokensis* by Stresemann, Meise and Schönwetter (Journ. f. Orn., 85, 1937, p. 513), but it may be separable as it seems to have more white in the tail than that form. If treated in this manner, then north China birds (Peking, etc.) would also have to be called *wladivostokensis*. Thus the latter would extend from the Sea of Japan westward to Kansu, where it gradually merges into *tibetanus*, and the range of *artatus* would be restricted to the eastern part of the Yangtze valley.

Parus major altarum La Touche

Measurements.—Szechwan, Maochow (6000 ft.), ♂, wing 73, tail 66, ♀, wing 73; Wenchwan, ♂, wing 70, tail 62; 18 miles S. W. of Wenchwan (5000 ft.) (Sage West China Expedition) ♂, wing 72, tail 64, ♀, wing 68, tail 62; Yunnan. Yung-Chang-Fu, ♂, wing 74, ♂ (= ? ♀) 69, tail 66, 62; Mengtz, ♂, wing 71, 72, 73, tail 64, 65, 66; ♀, wing 71, tail —. In this series the white spot on the penultimate rectrix varies between 22-37 mm.

This form, which extends from the river valleys of Szechwan to southern Yunnan, differs from *tibetanus* by slightly smaller size, less white on the penultimate rectrix, and by having a narrower wing bar which is usually whiter.

At first I thought that perhaps *subtibetanus* Kleinschmidt and Weigold might be an earlier name for this form (published Sept. 15, 1922, *altarum*, Nov. 29, 1922) but it appears to be closer to *tibetanus* in size, although really intermediate between the two forms. Tatsienlu lies at an altitude of 2700 meters and thus in altitude is situated between the elevations at which true representatives of either *tibetanus* or *altarum* are found.

From *artatus*, *altarum* may be distinguished chiefly by having much more white on the penultimate rectrix, and in addition by larger size and slightly more yellowish upper mantle. Birds from Siam and Burma have usually been called *altarum* but comparison with the above series shows them to be considerably smaller and to have the green portion of the back carried farther down toward the rump. These birds I propose to call:

Parus major nubicolus new subspecies

TYPE.—♂, ad., A. N. S. P., no. 131325, collected on Doi Pa Hom Pok, Siam-Southern Shan States border, on Jan. 23, 1938, by Lucas Bah.

Description.—Differs from *P. m. altarum* by smaller size, green of dorsal surface carried farther down the back toward the rump.

Measurements of type.—Wing 65, tail 56, culmen 8 mm. White on penultimate rectrix 23-37 mm.

Range.—From extreme western Tonkin to northern Siam, and north to Bhamo, Burma.

Measurements for *nubicolus* are as follows: ♂, wing 62-67.5, tail 54-62, ♀, wing 63-67, tail 53-61. White on penultimate rectrix 26-40 mm.

The name *nubicolus* has been chosen because Doi Pa Hom Pok means the mountain covered with a blanket.

Remarks.—Detail measurements of Siamese specimens are as follows: males, wing 62.5, 64, 66, 66.5, tail 54, 55, 56, 60. Females, wing 63, 67, tail 57, 61 mm., Keng Tung, Southern Shan States. Males, wing, 64, 65 (3), 66 (2), 66.5 (3), 67 (2), tail 57 (3), 58, 59, 60 (4), 61.5, 62, tail 53, 54, 54.5, 55, 57 (2) mm. Females, wing 61, 61.5 (2), 62, 63 (2) mm., Kalaw ♂, wing 66, tail 58; white mark on penultimate rectrix of the above series 26-40 mm., Northern Shan States. Pun-Thabei watershed ♂, wing 67.5, tail 62, Kyatpyin (Ruby Mines district), ♂, wing 63, tail ..; Maymyo, ♂, wing 64, tail 58, ♀ wing 64, tail 60; white mark on the penultimate rectrix 28-35. Bhamo, ♂, wing 67, tail 58, ♀ wing 64, 64, tail 58, 58; white mark on penultimate rectrix 25-27 mm.

Extreme measurements for the two forms are as follows: *altarum* ♂, wing 69-73, tail 62-66, ♀ wing 68-73, tail 62-66 mm., *nubicolus* wing ♂ 62-67.5, tail 54-62, ♀ wing 63-67, tail 53-61.

Birds from Laos and western Tonkin agree in size with *nubicolus*. The wings of seven males are recorded as 64-66 mm., and of three females 64-65 mm. The measurements are of rather worn birds. (See Bangs and Van Tyne, Field Mus. Nat. Hist., Zool., XVIII, 1931, p. 74).

Delacour described from Backan, north-eastern Tonkin, *P. m. indochinensis* as resembling *commixtus* " from S. China, but much smaller " (B. B. O. C., 47, 1926, p. 166). Later he relegated it to the synonymy of *commixtus* which is a gray, or gray tinged with green-backed form, very dull and different from the brightly colored, yellowish green-backed bird here described.

When *indochinensis* was described Delacour said that birds from Laos could also go by that name, but in his Liste des Oiseau de l'Indo-Chine Française (L'Ois., 1940, p. 199) birds from Backan and Langson, are called *commixtus* and those from northwestern Tonkin and Laos are called *altarum,* showing that northeast Tonkin birds differ from those occurring in Laos.

Material examined.—*Parus major minor;* 2 ♂, ♀, Hanada, near Tokyo; ♂, 2 o, Hokodate; 2 ♂, no locality, Japan. *Parus major artatus;* 7 ♂ ? ♀, Peking, Chihli; 3 ♂; Tsingtao, 3 ♂, Weishien, Shantung; 12 ♂, 6 ♀, Kiangyin, Kiangsu, and Mokanshan, Chekiang, China. *Parus major tibetanus;* ♀, Lhasa, Tibet. ♀, Molashe; 4 ♂, 6 ♀, Batang; 4 ♂, 4 ♀, Dawo; ♀, Derge; 2 ♂, northwest of Sungpan; ♀, Tatsienlu, Szechwan. *Parus major altarum;* ♂, 2 ♀, Maochow (6000 ft.); ♂, Wenchwan (6000 ft.); ♂, ♀, 18 miles s. w. of Wenchwan,[3] Szechwan; ♀, Mengtz[3] (co-type), 3 ♂, Mengtz[3]; 2 ♂, Yung-chang-fu,[3] Yunnan. *Parus major nubicolus;* 4 ♂, 2 ♀, Chieng Dao; ♂, Pa Hom Pok, Siam. 11 ♂, 6 ♀, Keng Tung; ♀, Kyatpyin[3] (Ruby Mines district); ♂, o, Kalaw,[3] Southern Shan States. ♂, ♀, Maymyo[3]; ♀, Pun-Thabei watershed[3]; ♂, 2 ♀, Bhamo,[3] Burma.

I should like to take this opportunity to thank Dr. Ernst Mayr of the American Museum of Natural History for lending me much important material, and further for his kindness in sending me a manuscript which he had prepared in 1936 dealing with the eastern green-backed forms of *Parus major.*

My thanks are also due to Mr. Herbert Deignan who kindly loaned me much material from collections of the United States National Museum.

With the material of these two institutions added to ours I have been able to examine over 200 specimens from the regions considered.

---

[3] American Museum of Natural History.

NOTULAE NATURAE

NUMBER 170 OF FEBRUARY 28, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DIATOMS FROM PATSCHKE BOG, TEXAS

BY RUTH PATRICK

Associate Curator, Department of Microscopy, The Academy of Natural Sciences of Philadelphia

The occurrence of peat in Texas is unusual. Very few peat deposits in the southern part of the United States have been investigated as to their diatom flora. Only five such studies are on record:—Cunningham's study in Montgomery, Alabama; Mann's study in Washington, D. C.; Hanna's study of Florida peat; and Boyer's, and Cocke, Lewis and Patrick's study of Dismal Swamp peat. This study is the first analysis of Texas peat for diatoms. This study of the diatoms of Patschke Bog, Lee County, Texas, was made possible through the kindness of Professor J. E. Potzger of Butler University. Samples of peat, taken at one foot intervals from the surface to a depth of twenty-two feet were examined for diatoms.

In an analysis such as this, the accuracy of the comparison of the relative frequency of occurrence of the various species in the different levels is important. Due to the technical difficulties of the procedures generally used in cleaning and mounting diatoms, there are many chances to introduce errors in relative frequency. The following technique was therefore devised.

A given amount of peat from each level, in this case 179.7 milligrams, was weighed out on an analytical balance. Each sample was then cleaned by the acid method, great care being taken that none of the residue was lost. When cleaning and washing were complete the residue was diluted in each case to 10 cc. with distilled water. The material was thoroughly agitated and by means of a special apparatus 0.2 cc. was drawn off and placed on each cover glass.

This special apparatus consisted of a column of mercury which could be raised and lowered in a graduated tube. This tube was graduated to a tenth of a cubic centimeter. By means of a rubber tube this tube was connected to a pipette. A different pipette was used for each level. The pipettes were carefully cleaned to assure that they would take up and deliver the same amount. By raising and lowering the column of mercury the same amount was taken up and then deposited on each cover glass. In this way it is believed that many of the errors introduced by less careful methods were avoided.

The diatoms were mounted in Hyrax and all diatoms listed below were ringed by means of an objective marker. The slides are deposited in the herbarium of the Academy of Natural Sciences of Philadelphia. The number in parenthesis refers to the catalog number of the slide in this herbarium.

EUNOTIACEAE

Desmogonium guianense Ehr.

Desmogonium guianense Ehr., 1848, apud Schomberg, Reisen in British Guiana, vol. 3, p. 539.

Hustedt (1938) states that this species is well developed at pH 4.8-5.5, and that ecologically it is similar to *Eunotia*. In this study its best development was at the three foot level.

Patschke Bog, 3 ft. (A-2481-82), 4 ft. (A-2483).

Eunotia exigua (Breb.)

Eunotia exigua (Breb.) Rabh., 1864, Flora Eur. Algarum, p. 73.

This species is often found in pH 3.5-5.5 in association with sphagnum. In this study it was found in two levels, but was rare.

Patschke Bog, 2 ft. (A-2479), 3 ft. (A-2482).

Eunotia pectinalis var **minor** (Kütz.)

Eunotia pectinalis var. *minor* (Kütz.) Rabh., 1864. Flora Eur. Algarum. p. 74.

This variety was just present in the 3 ft. level.

Patschke Bog, 3 ft. (A-2482).

Eunotia valida Hustedt

Eunotia valida Hustedt, 1930, apud Pascher Sussw.-Flora Mitteleurop., **10**: 178-179.

This species was of frequent occurrence in the 3 ft. level. It was also present in the 5 ft. level.

Patschke Bog, 3 ft. (A-2482), 5 ft. (A-2485).

NAVICULACEAE

Anomoeneis serians (Breb.)

Anomoeneis serians (Breb.) Cl., 1895, K. Sv. Vet. Akad. Handl., **27**(3): 7.

This species is often in bogs and swamps. It is one of the common forms in the bogs of New Jersey, and is also of common occurrence in Florida peat. Mr. Frank J. Keeley states that he has never found it except in association with species of the genus *Frustulia*. It occurs in that relationship here. It was common in the 3 ft. and 5 ft. levels.

Patschke Bog, 2 ft. - 5 ft. (A-2479-86).

Navicula festiva Krasske

Navicula festiva Krasske, 1925, Abhandl. u. Bericht. Ver. für Naturk. Cassel, **56**:47, pl. 1, fig. 16.

This species is usually found in association with moss. It was just present in the 3 ft. level.

Patschke Bog, 3 ft. (A-2481).

Navicula mutica Kütz.

Navicula mutica Kütz., 1844, Bacill., p. 93, pl. 3, fig. 32.

This species seems to prefer circumneutral to somewhat alkaline water. It was found only once and then it was rare.

Patschke Bog, 5 ft. (A-2485).

Neidium iridis var. **amphigomphus** (Ehr.)

Neidium iridis var. *amphigomphus* (Ehr.) Mayer, 1917, Denks. K. Bayer. Bot. Ges., **13**: n.s. 7: 30.

This species has been classified as a halophobe to indifferent form. It has been found in pH. 4-8. In this study it was of rare occurrence in the 5 ft. level.

Patschke Bog, 5 ft. (A-2485).

Pinnularia Brebisonii (Kütz.)

Pinnularia Brebisonii (Kütz.) Rabh., 1864, Flora Eur. Algarum, p. 222.

This species is classified by Kolbe as an oligohalobe. It was just present in the 5 ft. level.

Patschke Bog, 5 ft. (A-2485).

Pinnularia divergentissima (Grun.)

Pinnularia divergentissima (Grun.) Cl., 1895, K. Sv. Vet. Akad. Handl., **27** (3): 77.

This is usually a northern or alpine form. It was found only in the 5 ft. level, but was of frequent occurrence there.

Patschke Bog, 5 ft. (A-2486).

Pinnularia divergentissima f. elongata Cleve-Euler Fig. 2.

Pinnularia divergentissima f. *elongata* Cleve-Euler, 1934, Soc. Sci. Fennica Comm. Biol., **4** (14): 58, pl. 4, fig. 86.

I believe from Cleve-Euler's decription that my specimens are this form, but I cannot be sure as I have not seen her specimens. My specimens are 44 μ long, 5 μ broad, striae 10 in 10 μ. They were found only in the 5 ft. level.

Patschke Bog, 5 ft. (A-2485).

Pinnularia gibba Ehr.

Pinnularia gibba Ehr., 1843, Abhandl. K. Akad. Wiss. Berlin, **1841**: pl. 1, fig. II, 8.

Hustedt states that this species is an oligohalobe found in a pH range of 5.0-7.8.

Patschke Bog, 5 ft. (A-2485).

Pinnularia Hannii sp. nov. Fig. 1.

Valvae lineares, ellipticae, 173 μ longae, 37 μ latae; striis 4-5 in 10 μ. Area axiali circum quarta pars latitudinis valvae.

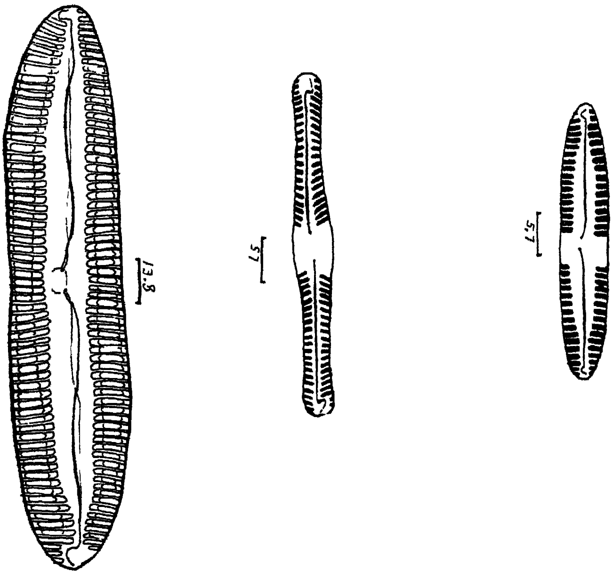


Fig. 1.—*Pinnularia Hannii* sp. nov. (left). Fig. 2.—*Pinnularia divergentissima* f. *elongata* Cleve-Euler (center). Fig. 3.—*Pinnularia latifascia* sp. nov. (right).

Type.—Patschke Bog, Texas, A.N.S.P. (A-2483).

Specimens of this species were first found by Hanna (1933). He believed this to be a form of *P. nobilis*. It differs from *P. nobilis* in the shape of the ends of the valve, not being swollen at the central nodule, and in the ratio of length to breadth. These specimens are very similar to *P. viridis* var. *latta* Freng. They differ mainly from this variety and the typical *P. viridis* in the number of striae, which are about 5 in 10 μ. The ratio of length to breadth is similar to that of *P. viridis* var. *latta,* but different from that of the typical *viridis*.

Patschke Bog, 4 ft. (A-2483).

Pinnularia latifascia sp. nov. Fig. 3

Valvae lineares, apicibus rotundatibus, 34 μ longae, 6 μ latae, striis 10 in 10 μ; area axiali circum tertia pars latitudinis valvae.

Type: Patschke Bog, Texas, A.N.S.P. (A-2485).

This species belongs to Cleve's subdivision of the genus, the *Parallelistriatae*. It is most closely related to *Pinnularia fasciata* but differs from it principally in the number of striae. *P. fasciata* is a much finer form.

Patschke Bog, 5 ft. (A-2485-86).

Pinnularia macilenta Ehr.

Pinnularia macilenta Ehr., 1843, Abhandl. K. Akad. Wiss. Berlin, **1841**: 421, pl. 2, fig. I, 23.

This species was present in the 5 ft. level.

Patschke Bog, 5 ft. (A-2485).

Pinnularia maior (Kütz.)

Pinnularia maior (Kütz.) W. Sm., 1853, Brit. Diat., vol. 1, p. 54, pl. 18, fig. 162.

This species is very commonly found in peat in the northern hemisphere.

Patschke Bog, 2 ft. - 5 ft. (A-2479-85).

Pinnularia viridis (Nitzsch) Ehr.

Pinnularia virdis (Nitzsch) Ehr., 1843, Abhandl. K. Akad. Wiss. Berlin, **1841**: pl. 1, figs. 1, 7; III, 3; IV, 3.

This species is often found in bogs and ditches. It seems to be an oligohalobe, pH 6.6-8.5.

Patschke Bog, 2 ft. - 5 ft. (A-2479-85).

DISCUSSION

The diatoms identified in this study clearly indicate that the water of this bog was acid. This is to be expected in a peat bog. The most common species found was *Anomoeneis serians*. It was always accompanied by fragments of specimens of the genus *Frustulia*. In every case the valves of

Frustulia had dissolved away except for the characteristic thickened portion containing the raphe. These two genera are also well represented in the Florida peat (Hanna, 1933).

The occurrence of *Desmogonium guianensis* is of interest. It was best represented in the 2 and 3 foot levels. This genus is typically tropical or subtropical in its distribution, but *D. guianensis* has been found from temperate regions. This species had not been recorded in the other studies of fossil peat in the southern part of the United States.

The four foot level differs considerably from the two foot level in that the genus *Pinnularia* is the dominant one and *Anomoeneis serians* and *Frustulia* are not so common. This might well be an indication of the presence of less sphagnum or other moss in this earlier, lower level.

The frequent occurrence in the five foot level of *Pinnularia divergentissima* and its variety *elongata,* which are cool water forms, is of considerable interest. This species, together with some of the other species of *Pinnularia,* may well indicate that the water at the time that the four and five foot levels were deposited was cooler than at the time of deposition of the two and three foot levels where they are absent or rare and *Desmogonium guianensis* is of more common occurrence. Though different species dominate, conditions seem to have been about equally favorable for diatom development from the five foot through the three foot level. These findings support those of Potzger and Tharp (1943).

The knowledge that such acid water floras existed in Texas in the recent past is of considerable interest. The only other studies of fossil diatoms in this general region were Woolman's studies of diatoms from the Staked Plains and the studies of Lohman and Patrick at Clovis, New Mexico. They all revealed floras which are characteristic of water of much higher salt content.

The only other studies of peat in southern United States except the study of peat in Dismal Swamp have been of peat which is of the Pleistocene Period. The flora of Patschke Bog more nearly resembles the flora of Florida peat than that of Washington, D. C., Dismal Swamp or Mobile, Alabama, but it does not contain some of the more characteristic species of the Florida deposit. Hanna (1933) states that it would take 30,000 years for twenty feet of peat to accumulate. This would be near the time, if not at the time, of the Glacial Period. Though the peat of Patschke Bog is twenty-two feet deep, no diatom flora is found below the five foot level, though some fragments of diatoms were found at lower levels. I do not find any reason for believing that this is other than a recent formation.

Bibliography

Boyer, C. S., 1898. Notes on the Diatoms, pp. 422-428 in; Woolman, L., Fossil Mollusks and Diatoms from Dismal Swamp, Virginia and North Carolina; indications of the geological age of the deposits. Proc. Acad. Nat. Sci. Phila., *50:* 422-428.

Cocke, E. C., I. F. Lewis and R. Patrick, 1934. A Further Study of Dismal Swamp. Amer. Jour. Bot., *21:* 374-395.

Cunningham, K. M., 1894. Diatomaceae, Geol. Surv., Report on the Geology of the Costal Plain of Alabama, 1894. 61-65.

Edwards, A. M., 1906. On a deposit of Bacillaria from Texas and New Mexico, Nuova Notarisia, *17:* 61-69.

Hanna, G. D., 1933. Diatoms of the Florida peat Deposits. Twenty-third-Twenty-fourth Annual Report Fla. Geol. Surv., 1933: 57-120.

Hustedt, F., 1937-38. Syst. und ökolog. Untersuch. uber Diat.-Flora von Java, Bali und Sumatra nach dem material Deutsch. Limnolog. Sunda-Exped. Syst. Teil I. Suppl. Arch. Hydrobiol. und Planktonk. *15:* 131-177, 187-295, 393-506.

Lohman, K. E., 1935, Diatoms from Quaternary lake beds near Clovis, New Mexico. Jour. Paleontology *9* (5): 455-59

Mann, A., 1924. Diatom Deposit found in the Excavation. Jour. Wash. Acad. Sci., *14* (1): 26-32.

Potzger, J. E., and B. C. Tharp, 1943, Pollen records of Canadian spruce and fir from Texas bog. Science *98* (2557): 584.

Woolman, L. and C. H. Kain, 1892. Fresh Water diatomaceous Deposit from the Staked Plains, Texas. Amer. Nat., *26:* 505-506.

NOTULAE NATURAE

NUMBER 171 OF MARCH 26, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NEW PEMPHILIDINE WASPS, WITH NOTES ON PREVIOUSLY DESCRIBED FORMS. I. ECTEMNIUS (HYMENOPTERA: SPHECIDAE)

BY V. S. L. PATE

Research Associate, Academy of Natural Sciences of Philadelphia

The Pemphilidine wasps of North and Middle America have long been in need of critical study. Up to the present nearly three hundred species have been described, but many of these names are synonyms. Yet there still are a number of undescribed forms to be made known from this general area. During the past few years I have had an opportunity to study a number of large collections of these wasps, and in particular the excellent one of the United States National Museum. The results of these investigations will eventually be embodied in a monograph dealing with the forms inhabiting North and Middle America. It seems advisable, however, to put on record now certain synonymic data and new species in order that these may be available to other investigators.

It gives me great pleasure to acknowledge the many kindnesses and courtesies extended to me by Mr. C. F. W. Muesebeck, in charge of the Division of Insect Identification of the Bureau of Entomology and Plant Quarantine, and Dr. E. A. Chapin, Curator of Insects, during several months service recently with the Bureau at the United States National Museum.

The types of two of the new forms described on the following pages were taken by the personnel of the Southwest Orthoptera Survey of 1937 of the Academy of Natural Sciences of Philadelphia, an expedition financed by a grant from the Penrose Fund of the American Philosophical Society, and the Academy of Natural Sciences of Philadelphia.

ECTEMNIUS Dahlbom

The large and ubiquitous genus *Ectemnius* has between forty and fifty representatives, distributed among seven subgenera, in North and Middle America. Synonymic notes on, and descriptions of, a number of these will be found below.

Ectemnius (Protothyreopus) dilectus (Cresson)

Crabro dilectus Cresson, Proc. Ent. Soc. Phila., IV, p. 478, (1865); [♀, ♂; Mountain region, Colorado Territory; summer, 1864; James Ridings].

Crabro bigeminus Patton, Canad. Entom., XI, p. 213, (1879); [♀, ♂; Waterbury, Conn.]. (New synonymy.)

Crabro (*Protothyreopus*) *megacephalus* Rohwer, Ent. News, XIX, p. 249, (1908); [♀; Florissant, Colorado]; (nec *Crabro megacephalus* Megerle von Muhlfeld, MS [in Dahlbom, 1845]; *nec* Smith, 1873). (New synonymy.)

Crabro (*Protothyreopus*) *dilectiformis* Rohwer. Ent. News, XX, p. 146, (1909); [♀; Milwaukee Co., Wisconsin]. (New synonymy.)

Crabro (*Protothyreopus*) *crassiceps* Mickel, Trans. Amer. Ent. Soc., XLII, p. 425, (1916); [♀; Ute Creek, Colorado]. (New synonymy.)

Typical *dilectus* occurs throughout the middle and far western states. Patton's *bigeminus* is little more than a color form of *dilectus*, but the name may be applied to an Atlantic coastal race.

Ectemnius (Clytochrysus) nigrifrons (Cresson)

Crabro nigriforns Cresson, Proc. Ent. Soc. Phila., IV, p. 482, (1865); [♂; Mountain region, Colorado Territory; summer, 1865; James Ridings].

Crabro (*Solenius*) *planifrons* Thomson, Opus. Entom., fasc. 2, p. 173, (1870); [♂, ♀].

The European species which has hitherto been known as *Crabro* (*Clytochrysus*) *planifrons* Thomson, 1870, is identical with the type of *Crabro nigrifrons* Cresson, 1865. Nearctic specimens of *nigrifrons* Cresson, compared with European material determined by Kohl as *planifrons*, agree in all essential respects.

Ectemnius (Clytochrysus) lapidarius (Panzer)

Crabro fossorius Panzer, Faun. Insect. German., Fasc. 72, Tab. 11, (1799); [♀]; [= *Crabro lapidarius* Panzer, 1805 nec *Sphex fossoria* Linnaeus, 1758: *teste* Van der Linden, 1829, *q. v.*].—Van der Linden, Nouv. Mem. Acad. R. Sci. Bruxelles, V, no. 3, p. 53, no. 10, (1829).

Crabro lapidarius Panzer, Faun. Insect. German., Fasc. 90, Tab. 12, (1804); [♂; "Habitat in editionibus"]; (Not *Crabro lapidarius* Fabricius, Syst. Piez., p. 309, no. 6, (1805); ["Habitat Kiliae"].)—Dahlbom, Ex. Hist.-Nat. Crabr. Scandinav., p. 91, no. 25, pl. 5, (1840).

Crabro (*Solenius*) *lapidarius* Dahlbom, Hymen. Europ., I, p. 405, (1845); [♂, ♀].—Wesmael, Bull. Acad. R. Sci. Bruxelles, XIX, no. 4, p. 617, no. 32, (1852).

Crabro chrysostomus Lepeletier and Brullé, Ann. Soc. Ent. France, III, p. 704, (1835); [♀: (= "*Crabro fossorius* Van der L., Fouis., par. 2, p. 53, 10, En retranchant tous les synonymes")]. (*Nec* Gmelin, 1790.) (New synonymy.)

Crabro comptus Lepeletier and Brullé, Ann. Soc. Ent. France, III, p. 705, (1835); [♂; France]. (New synonymy.)

Crabro xylurgus Shuckard, Essay Indig. Foss. Hymen., p. 139, (1837); [♀, ♂; England]. (New synonymy.)

Crabro interstinctus F. Smith, Zoologist, IX, p. cxxvi, (1851); [♂].

Crabro obscurus F. Smith, Cat. Hymen. Brit. Mus., IV, p. 418, (1856); [♀, ♂; Hudson's Bay]. (New synonymy.)

Crabro denticulatus Packard, Proc. Ent. Soc. Phila., VI, p. 104, (1866); [♂; New York]. (New synonymy.)

Crabro gracilissimus Packard, Proc. Ent. Soc. Phila., VI, p. 78, (1866); [♂, ♀; Massachusetts; New York; Delaware]. (New synonymy.)

Crabro (Clytochrysus) chrysostomus Kohl, Ann. k k. Naturhist. Hofmus. Wien, XXIX, p. 64, (1915).

This species is common and widespread throughout the entire Holarctic Region. In North America, it has been known hitherto as either *Crabro obscurus* Smith, *C. gracilissimus* Packard or *C. denticulatus* Packard. Nearctic material of this species is apt to show minor variations, but nevertheless it agrees in all essential respects with European specimens determined by Kohl as *Crabro chrysostomus* L. & B., as well as his description and figures of this species. But the oldest name for the species is probably *Crabro lapidarius* Panzer, 1804; the specific name *lapidarius* is not pre-occupied by *Apis lapidaria* Linnaeus, 1758, which is now applicable to a species of *Bombus*. Nor does *Vespa lapidaris* Christ, 1791 (generally given in error as *lapidarius*) invalidate Panzer's name. The exact identity of *Crabro lapidarius* Panzer, 1804 is not altogether certain and must eventually be settled by an examination of the type, presumably in the Sturm Collection at Munich. But Van der Linden, Dahlbom, Lepeletier (despite his denial of the fact!), and other early authors were apparently quite certain of the identity of Panzer's *lapidarius*, and, until I obtain information to the contrary, I choose to follow their interpretation. However, in the event that *lapidarius* Panzer should not prove to be the correct name for this species, the next available name is *Crabro comptus* Lepeletier and Brullé, 1835 and not *Crabro chrysostomus* Lepeletier and Brullé, 1835, which is pre-occupied by Gmelin's 1790 name.

Ectemnius (Clytochrysus) yosemite new species

The shaggy pubescence of the alitrunk and the distinctively shaped, bidentate clypeal lobe immediately differentiate *yosemite* from all other *Clytochrysus*.

Type.— ♀; Mariposa Grove of Big Trees, Yosemite National Park, Mariposa County, California. Elevation, 6600 feet. August 6, 1937. (V. S. L. Pate; flying about low growth of *Sequoia washingtoniana* in company with *Pemphilis* (*Synothyreopus*) *conspicuus* (Cress.).) [Academy of Natural Sciences of Philadelphia, Type no. 10583.]

Female. Length 11 mm. Black; the following stramineous: mandibles with a median stripe, scapes, pronotum dorsally, pronotal tubercles, tegulae with a small spot anteriorly, first five tergites with fasciae, the first four narrow and median in position, those of the first two segments broadly interrupted medially, fascia of fifth tergite broad and covering the apical half of segment; second sternite with a large lateral spot on each side; third and fourth sternites with narrow median fasciae widening laterally into a large spot; fifth and sixth sternites on apical half; all femora narrowly at apex; all tibiae and tarsi, the latter with last segment brunneous. Tegulae fulvohyaline; axillary sclerites brunneous. Wings clear; stigma and veins deep fulvous.

Head subopaque; clypeus and inner orbits broadly with heavy appressed light golden pile; vertex more thinly clad with long, erect, dark hair; temples with a broad band of appressed light golden pubescence along posterior orbits, the remainder with a thin vestiture of long, decumbent silvery hair. Front with a normally wide, subopaque, glabrous, immarginate scapal sinus; vertex flat, with moderately fine close puncturation throughout; supraorbital foveae not apparent; ocelli in a low triangle, the postocellar distance about three-fourths (0.77) the ocellocular line; occipital carina moderately developed but not appreciably flanged, foveolate, a complete circle in extent, nor attaining the hypostomal carinule which is lobed medioposteriorly. Antennae with scapes subcylindrical, ecarinate, seven-tenths the vertical eye length; pedicel subcylindrical, one-third the length of first flagellar article; flagellum simple, first segment twice the length of second which is subequal in length to third, penult article seven-tenths the length of ultimate segment. Clypeus about one-third (0.35) the vertical eye length; flatly tectate, bisected by a distinct keel; clypeal lobe subtruncate, roundly emarginate medio-apically and with a large, distinct tooth on each side of emargination.

Thorax more or less opaque; clothed with a moderate vestiture of long, erect, light hair throughout. Pronotum short, ecarinate, deeply notched medially, laterad of which the surface is shallowly concave to the rounded, prominent humeri. Mesonotum with moderately close puncturation throughout, mesonotal ridges weak; mesonotal-scutellar suture deeply impressed; axillae small, immarginate; scutellum tumid, impunctate anteriorly to longitudinally striatopunctate posteriorly; postscutellum transversely tumid, finely punctured. Mesopleura subfulgid; with scattered setigerous punctures throughout and faint horizontal aciculation above; metapleura subfulgid, horizontally striate. Propodeum with a vestiture similar to that of thorax; dorsal face without trace of a trigonal enclosure, the anterior margin coarsely foveolate, disc with moderately large, setigerous punctures and a few radiate striae, bisected by a narrow, weakly marginate furrow; posterior face with a shallow, immarginate discal fovea, traversed by parallel, horizontal striae passing around onto lateral faces; no trace of lateral carinae or impressions separating the different faces.

Fore wings with marginal cell narrow and elongate, four times as long as wide; radial vein with second abscissa four-fifths the length of first abscissa; transverse cubital vein oblique, inclivous, sigmoid, one and a half times the length of the second cubital abscissa; cubitus with first abscissa eight times the length of the second abscissa.

Legs with coxae, trochanters and femora clothed with long shaggy hair. Fore femora subtriquetrous; fore metatarsi without a pecten. Middle and hind tibiae moderately spinose on outer faces; longer calcar of hind tibiae seven-tenths the length of hind metatarsi.

Abdomen sessile, subfulgid. Tergites with very fine, close puncturation throughout except the first which is almost impunctate save at apex. First tergite with long, shaggy pubescence similar to thorax; remaining tergites with very fine, appressed puberulent pubescence which is heavier laterally; fourth and fifth tergites with a transverse, subapical row of long, decumbent, golden setulae. Pygidial area strongly narrowed, excavated and canaliculate apically, the lateral margins with dense brushes of golden setulae. Sternites fulgid, impunctate, but with microscopically fine cancellate sculpture; with a very thin clothing of decumbent golden hair, and a transverse, subapical row of erect golden setulae.

Male. Unknown.

This large and handsome species is known only from the unique female described above.

Ectemnius (Clytochrysus) zonatus (Panzer)

This common European species is an unexpected addition to the New World fauna. In the collection of the United States National Museum I have recently examined a male taken August 21 at Tegucigalpa, Honduras, by F. J. Dyer. After careful investigation of the source of this material, I am convinced that the locality record is accurate. F. J. Dyer was a U. S. Consul, formerly stationed in Central America, who made collections throughout that region and forwarded them to Washington and New York. Undoubtedly *zonatus* must be regarded at present as only an adventive form, but all collections from Middle America and the southern United States should be carefully scrutinized for further material in order to determine if *zonatus* has become established in the New World.

Ectemnius (Hypocrabro) alpheus[1] new species

Crabro Packardii Fox, Trans. Amer. Ent. Soc., XXII, p. 152, (1895). [♂ in part; not of Cresson, 1865.]

The present species is closely allied to *10-maculatus* Say with which it agrees in having the glabrous area of the front reduced to a mere line and

---

[1] It gives me great pleasure and satisfaction to dedicate this, our largest and handsomest Pemphilid, to the most outstanding entomologist of America, Alpheus Spring Packard.

the antennal flagellum of the male simple and edentate. But both sexes of *alpheus* have the clypeal lobe differently shaped, and, in the female sex, the last abdominal segment is wholly yellow with the pygidial area bisected by a strong carinule, and the propodeum lacks a transverse row of foveae between the dorsal and posterior faces, while the males of *alpheus* lack the tooth and pencil of hairs on the fore trochanters which are such characteristic features of that sex of *10-maculatus*.

Type.— ♀; Yosemite [National Park, Mariposa County,] California. (No other data.) [Academy of Natural Sciences of Philadelphia, Type no. 10584.]

Female. Length 17 mm. Black; the following deep citrinous: mandibles except black apices, antennal scapes, pedicel, pronotum dorsally, tubercles, axillae, scutellum with a narrow transverse stripe anteriorly, postscutellum, prepectus, tegulae with a small spot anteriorly, propodeum with a large spot posteriorly on each lateral face, first abdominal tergite with a broad subapical fascia, second and third tergites with broad median fasciae narrowed medially, fourth, fifth and sixth tergites entirely; second abdominal sternite wholly except for a large spot anteriolaterally on each side, remaining sternites entirely; all trochanters, all femora wholly except for an elongate dark spot on inner faces; all tibiae and tarsi, the apical segments of the latter rufescent. Tegulae and axillary sclerites fulvous. Wings clear, tinged with fulvous; veins and stigma deep fulvous.

Head massive, subcuboidal, subfulgid. Clypeus and front clothed with dense, appressed, light golden pile, the front with the customary glabrous area reduced to a mere line; vertex with a very thin vestiture of appressed, puberulent golden hair and an even sparser clothing of longer suberect hairs; temples with posterior orbits margined by a broad band of appressed golden pubescence, the remainder with a thinner clothing of longer decumbent light golden hair. Vertex with fine close puncturation throughout; supra-orbital foveae large but very indistinct; ocelli in a low isosceles triangle, the postocellar line six-tenths the ocellocular distance; temples with fine setigerous acupuncturation. Occipital carina distinct but neither flanged nor foveolate, attaining the posterior angles of the hypostomal carinule bordering the subquadrate oral fossa, the posterior margin of which has a small median lobe. Antennal sockets approximate but not quite contiguous to nearest lower inner orbits; scapes subcylindrical, slightly bowed, ecarinate, about two-thirds (0.687) the vertical eye length; pedicel cylindrical, one-half the length of first flagellar article; flagellum simple, second segment seven-tenths the length of first article and one and a sixth the length of third; ultimate article one and a half times the length of penult segment. Clypeus with median length one-third the vertical eye length; with a median keel ending in a strong discal tubercle which forms the apex of a broad trigonal, glabrous, polite, slightly concave bevel running the width of clypeal lobe, the apical margin of which is quadricrenulate.

Thorax subopaque; with a moderate vestiture of suberect, more or less golden hair dorsally, the pleura more distinctly clothed with decumbent silvery hair. Pronotum strongly notched medially; anterior dorsal margin transversely carinate; humeri with a sharp carinule descending vertically, behind which is a short but strong transverse impression followed by a high torus; the posterior margin very strongly and abruptly impressed. Mesonotum with fine, very close puncturation throughout, the mesonotal ridges moderate; axillae large but immarginate; scutellum gently tumid, almost impunctate anteriorly to strongly punctate posteriorly; postscutellum finely punctate. Mesopleura distinctly punctate and strongly, horizontally striate, posterior half of sternostirae evident. Metapleura glabrous, finely, horizontally striate. Propodeum with an inconspicuous vestiture of erect, light golden hair; dorsal face without a trigonal enclosure; with small setigerous punctures and oblique aciculation, the anterior margin strongly foveolate, bisected by a very narrow marginate sulcus which is continuous onto and likewise bisects posterior face which is finely horizontally aciculate, the aciculation continuous onto lateral faces; no lateral carinae or impressions separating the different faces.

Fore wings with marginal cell three and two-thirds as long as wide; radial vein with first abscissa one and three-eighths as long as second abscissa; transverse cubital vein two and a half times the length of second cubital abscissa; cubitus with second abscissa one-tenth the length of first abscissa.

Legs simple. Fore femora subtriquetrous, outer faces margined basally and posteriorly by a carinule; fore metatarsi with a very weak pecten. Middle and hind tibiae rather strongly spinose on outer faces. Longer hind tibial calcar subcultriform, five-ninths (0.55) the length of hind metatarsi.

Abdomen sessile, subfulgid. Tergites finely acupunctate throughout, with a thin and inconspicuous vestiture of puberulent light golden pubescence; ultimate tergite with a pygidial area which is strongly narrowed, excavate and canaliculate apically, the disc coarsely punctate and bisected by a strong carinule, the lateral margins fringed with brushes of yellow setulae. Second sternite with a few scattered small punctures and together with remaining sternites with a submarginal row of setigerous punctures bearing erect yellow setae.

Allotype.—♂; W[ashington] T[erritory]. (No other data.) [Academy of Natural Sciences of Philadelphia.]

Male. Length 12 mm. The following features are those noteworthy of difference from those given in the foregoing diagnosis of the female (type).

Livery identical with that of female.

Head similar to female but puncturation of vertex and temples more distinct; postocellar line about seven-tenths (0.72) the ocellocular distance. Antennal scapes slightly curved, ecarinate, seven-tenths the vertical eye length; pedicel four-tenths the length of first flagellar article; flagellum with all segments simple, none emarginate or dentate beneath, first segment one and a half the length of second which is one and a quarter the length of third, last two segments subequal in length. Clypeus with median length one-third the vertical eye length; basal half tectate and bisected by a keel, apical half of median lobe tumid and gently declivent to the gently rounded apical margin, the apical half of clypeal lobe glabrous, nitidous.

Thorax with mesonotum more coarsely punctate. Mesopleura rugosopunctate. Propodeum with dorsal face finely rugosopunctate, separated from posterior face by an indistinct, weakly foveolate groove; posterior and lateral faces more coarsely aciculate than in female.

Fore wings with marginal cell three and a half times as long as wide; radial vein with first and second abscissae subequal in length; transverse cubital vein one and three-fifths the length of second cubital abscissa; cubitus with second abscissa one-sixth the length of first abscissa.

Legs simple. Fore trochanters edentate and without a pencil of hair beneath. All tibiae and tarsi simple. Longer calcar of hind tibiae one-half the length of hind metatarsi.

Abdomen fulgid. All tergites with distinct though fine puncturation. Ultimate tergite galeate, bisected by a furrow, the apex and lateral margins strongly flanged. Seventh sternite with apical margin broadly, roundly emarginate; eighth sternite with apex entire.

Paratypes.—2; 1 male, 1 female, as follows:

WASHINGTON: W[ashington] T[erritory]; (no other data): 1 ♂; [A. N. S. P.].

UTAH: South Creek, Beaver County; July: 1 ♀; [U. S. N. M.].

The paratypes agree with the types in all essential features of livery and structural detail save that the topotypical male has a pair of small yellow spots on the clypeus.

Ectemnius (Hypocrabro) 10-maculatus 10-maculatus (Say)

Crabro 10-maculatus Say, West. Quart. Reporter, II, (1), p. 78, (1823); [Inhabits Missouri].

Crabro collinus F. Smith, Cat. Hymen. Brit. Mus., IV, p. 420, (1856); [♂; St. John's Bluff, East Florida].

Crabro aurifrons F. Smith, Catal. Hymen. Brit. Mus., IV, p. 420, (1856); [♀; Georgia].

Crabro (*Hoplocrabro*) *novanus* Rohwer, Proc. U. S. Nat. Mus., XL, p. 564, (1911); [♀, ♂; Meadow Valley: [head of Rio Piedras Verdes (six miles south of Colonia Garcia), Sierra Madre, Chihuahua], Mexico]. (New synonymy.)

Rohwer's *Crabro novanus*, described from the Sierra Madre of western Chihuahua, is merely a minor color variant of the nominate race of *10-maculatus* (Say).

This common and widespread species is represented in south and central peninsular Florida by the following distinctive race.

Ectemnius (Hypocrabro) 10-maculatus tequesta[2] new subspecies

The deeply infuscated wings and red first two abdominal segments differentiate the Floridian *tequesta* from the nominate subspecies of *10-maculatus.*

Type.— ♀ ; Miami, Dade County, Florida. August 21. [Academy of Natural Sciences of Philadelphia, Type no. 10587.]

Female. Length 16 mm. Similar to the nominate race except in the following noteworthy features:

Black. The following citrinous: mandibles on basal half, scape and pedicel, pronotum dorsally, tubercles, postscutellum, fore and middle tibiae on outer faces, basal four segments of all tarsi, and second to fourth abdominal tergites with inconspicuous lateral spots. Deep fulvous: all legs exclusive of yellow maculation, tegulae and axillary sclerites, and margins of yellow maculation on pronotum. Rufous: first two abdominal segments, posterior face of propodeum, scutellum; and small spots on prepectus, mesopleura, metapleura, and lateral faces of propodeum. Wings strongly infumated.

Puncturation of head, thorax, and abdomen stronger and coarser. Pile of clypeus and front distinctly golden.

Allotype.— ♂ ; Topotypic. Same data as Type. [Academy of Natural Sciences of Philadelphia.]

Male. Length 13.5 mm. Agrees with the type in all essential particulars but rufous maculation of thorax more extensive and pronounced, and puncturation of body and sculpturing of propodeum coarser.

Paratypes.—4 males, 3 females, as follows:

FLORIDA: Miami, Dade Co.; (F. W. Poponoe; collected on mango): 3 ♂ ; May, 1917; (W. M. Mann): 1 ♀. Homestead, Dade Co.; April 18, 1924; (T. R. Robinson; at flowers of avocado): 1 ♀. Royal Palm State Park, Dade Co.; March 25, 1929; (G. P. Englehardt): 1 ♂. Paradise Key; April 1, 1919; (C. A. Mosler): 1 ♀. [All U. S. N. M.]

Ectemnius (Hypocrabro) chrysargyrus (Lepeletier et Brullé)

Crabro chrysargyrus Lepeletier et Brullé, Ann. Soc. Ent. France, III, p. 711, (1835); [♀ ; Philadelphia].

Crabro arcuatus Say, Boston Journ. Nat. Hist., I, (4), p. 376, (1837); [♀, ♂ ; (New Harmony ?), Indiana].

Crabro chrysargurus Dahlbom, Hymen. Europ., I, p. 386, (1845); [♀ ; Philadelphia].

Crabro chrysarginus Lepeletier, Hist. Nat. Insect., Hymen., III, p. 114, (1845); [♀ ; Philadelphia].

Crabro Packardii Cresson, Proc. Ent. Soc. Phila., IV, p. 477, (1865); [♀, ♂ ; Mountain region, Colorado Territory; summer, 1864; James Ridings].—Cresson, Mem. Amer. Ent. Soc., no. 1, p. 103, (1916); [♀ ; Colorado. Lectotype]. (New synonymy.)

---

[2] After the Tequesta Indians of southeastern Florida.

Crabro honestus Cresson, Proc. Ent. Soc. Phila., IV, p. 485, (1865); [♀; (*recte* ♂); Mountain region, Colorado Territory; summer, 1864; James Ridings].

Crabro villosifrons Packard, Proc. Ent. Soc Phila., VI, p. 84, (1866); [♀; New Jersey; Pennsylvania].

Crabro (subgen. ?) *nokomis* Rohwer, Ent. News, XIX, p. 252, (1908); [♀; Florissant, Colorado]. (New synonymy.)

The above synonymy is based upon a study of the types of Cresson, Packard and Rohwer. Cresson's *Packardii* is merely a very fully maculated form of *chrysargyrus* and may be recognized as a western color variety of this common and widespread North American species.

Ectemnius (Hypocrabro) continuus (Fabricius)

Sphex vaga Auctt., *nec* Linnaeus, 1758. [*Cf.* Richards, 1937, Trans. R. Ent. Soc. London, LXXXIII, pp. 168-169.]

Crabro continuus Fabricius, Systema Piezatorum, p. 312, no. 21, (1805); [Tangiers].

C[*rabro*] *6-maculatus* Say, Long's Exped. St. Peter's R, II, p. 341, (1824); [♀; Pennsylvania]. (*nec* Olivier, 1791.) (New synonymy.)

Xylocrabro slossonae Ashmead, Ent. News, XIII, p. 5, (1902); [♂; Mt. Washington, N. H.]; (nomen nudum). (New synonymy.)

Crabro sayi Cockerell, The Entomologist, XLIII, p. 61, (Feb., 1910); [new name for *Crabro 6-maculatus* Say, 1824 *nec* Olivier, 1791]. (New synonymy.)

Crabro bisexmaculatus Viereck, [in Smith, List Insects of New Jersey], Ann. Rept. New Jersey St. Mus., 1909, p. 681, (Dec., 1910); [new name for *Crabro 6-maculatus* Say, 1824 *nec* Olivier, 1791]. (New synonymy.)

Solenius (*Hypocrabro*) *giffardi* Rohwer, Proc. U. S. Nat. Mus., LIII, p. 242, (1917); [♀, ♂; Alameda Co., California]. (New synonymy.)

This is probably one of the commonest species of Pemphilid wasps in North America where it ranges from the Atlantic to the Pacific Oceans and from Mexico to Alaska and even into Kamchatka. North American specimens of this wasp have hitherto been reported as either *Crabro 6-maculatus* or *C. sayi*, but I can find no essential difference between Nearctic specimens and European material determined by Kohl and other authors as *Crabro vagus* L. However, as Richards has shown after an examination of the Linnaean type, *Sphex vaga* Linnaeus, 1758 is merely the opposite sex of *Mellinus arvensis* Linnaeus, 1758; the next available name for the present species is then *Crabro continuus* Fabricius, 1805. Rohwer's *giffardi* is merely a very fully maculated form of *continuus* and may be recognized as a color variety.

Ectemnius (Hypocrabro) satan new species

The present species is closely allied to *odyneroides* Cresson, but may be distinguished from that species by its finely punctate vertex, the transversely rugosopunctate mesonotum, the presence of a strong horizontal carinule separating the dorsal and posterior propodeal faces and the strong constrictions between the abdominal segments. Furthermore, in *odyneroides* the occipital carinule attains the posterior angles of the hypostomal carinule bordering the oral fossa, whereas in *satan* the occipital carina is tangent to the median posterior margin of the hypostomal carinule.

Type.—♂; Canyon, north side of Satan Pass, between Thoreau and Crown Point, McKinley County, New Mexico. Elevation, 7100 feet. July 17, 1937. (V. S. L. Pate.) [Academy of Natural Sciences of Philadelphia, Type no. 10585.]

Male. Length 8 mm. Black; the following citrinous: basal half of mandibles (apices deep reddish black), scapes, pronotum dorsally, tubercles, prepectus with a large spot above, axillae, scutellum with a small spot in each anterior angle, postscutellum, first six abdominal tergites with moderately wide fasciae, those of second and third narrowly interrupted medially; fore femora beneath, middle femora on apical half beneath, all tibiae on outer faces, fore and middle metatarsi. Fulvous: fore femora and tibiae on inner faces; hind tarsi; four distal segments of fore and middle tarsi; tegulae and axillary sclerites. Wings clear; veins and stigma deep fulvous.

Head subcuboidal; fulgid. Clypeus and front along inner orbits with dense appressed silvery pile; vertex with a thin vestiture of appressed aeneous puberulent pubescence; temples thinly clad with appressed silvery pubescence. Front with a wide glabrous, polite scapal area; upper horizontal portion with fine, rather close punctures; supra-orbital foveae not apparent; postocellar line subequal in length to the ocellocular distance; vertex and temples with very fine, separated punctures; occipital carina efoveate but very strongly flanged and tangent below to the median posterior margin of the hypostomal carinule bordering the subcampanulate oral fossa. Antennal scapes carinate lengthwise, about seven-tenths (0.72) the vertical eye length; pedicel one-half the length of first flagellar article; flagellum with second and third segments subequal in length and four-fifths the length of first article, the penult segment five-eighths the length of the simple, obterete ultimate article; second segment weakly constricted basally beneath, third segment gently excised basally beneath, the apical half rounded out, fourth segment very strongly emarginate beneath and produced at apex beneath into a strong projecting tooth; remaining articles simple. Clypeus with median length about one-fourth the vertical eye length, weakly tectate, keeled discally; apical margin of lobe subtruncate to gently rounded out, the lateral angles with a small rounded emargination thus making them appear bidenticulate. Mandibles with apices evenly bidentate, inner margins with a large basal tooth.

Thorax subfulgid to fulgid. Dorsum clothed with a thin vestiture of erect short aeneous hair; pleura with a thin clothing of short decumbent silvery pile. Pronotum with anterior dorsal margin with a transverse, cristate carina, notched medially, obtusely angulate at humeri, the dorsal surface with a transverse torus, each humeral angle with a small tooth from which descends obliquely inward a short but distinct carinule; posterior margin strongly impressed. Mesonotum with rather coarse, close punctures which are contiguous and make surface appear transversely rugosostriate anteriorly; mesonotal ridges absent; suture between mesonotum and scutellum deeply impressed; axillae large, ovate, scarcely punctate, immarginate laterally; scutellum tumid, sparsely punctate anteriorly to closely longitudinally striatopunctate posteriorly; postscutellum longitudinally striatopunctate. Mesopleura rather coarsely punctate and horizontally costulate, particularly above; metapleura longitudinally lineate. Propodeum subfulgid, with a thin and inconspicuous vestiture of erect, short light hair; dorsal face rugoareolate, bisected by a narrow, strongly marginate sulcus which passes into the narrow immarginate furrow bisecting the posterior face, separated from both lateral and posterior faces by a strong horizontal carinule; posterior face with strong transverse rugae; lateral carinae absent but posterior face separated from lateral faces by a weak subfoveate vertical impression; lateral faces horizontally aciculate.

Fore wing with marginal cell three and a half times as long as wide; radial vein with first abscissa subequal in length to second; transverse cubital vein oblique, inclivous, one and a half times the length of second cubital abscissa; cubitus with second abscissa one-fifth the length of first abscissa of cubitus.

Legs relatively simple. All tarsi and tibiae simple, unmodified. Fore femora subtriquetrous, basal and outer posterior edges margined sharply by a carinule. Hind tarsi compressed, the longer calcar about two-fifths (0.43) the length of hind metatarsi.

Abdomen fulgid; very strongly constricted between first three or four segments. Tergites with a thin vestiture of decumbent silvery puberulent pubescence; all distinctly and moderately coarsely punctate; first five weakly cingulate just before apex; ultimate tergite galeate, not bisected by a furrow, the apical and lateral margins scarcely flanged. Sternites with a very thin vestiture of decumbent, short silvery hair; second sternite with coarse separated punctures on disc becoming finer and closer laterally; third and fourth sternites finely punctate and with a transverse median torus; remaining sternites flat, with very fine, well separated, setigerous acupuncturation; apical sternite with caudal margin truncate.

Female. Unknown.

Paratypes.—Three topotypical males which agree with the type in all essential features of livery and structural detail.

Ectemnius (Hypocrabro) texanus ais[3] new subspecies

Crabro excavatus Fox, Ent. News, III, p. 10, (1892); [♂ in part].

The peninsular Floridian race *ais* is distinguished from the nominate form of *texanus* by its deep fuliginous wings, reddish livery, and more strongly punctured and sculptured body.

---

[3] After the Ais Indians of east-central Florida.

Type.—♀; Indian River, Brevard County, Florida. [Academy of Natural Sciences of Philadelphia, Type no. 10586.]

Female. Length 6.5 mm. Similar to the nominate race save in the following distinctive particulars:

Livery: black; the following deep saturated aurantiacous: mandibles, scapes and basal flagellar segments, pronotum to and including the tubercles, spot on prepectus, axillae, scutellum and postscutellum, all legs entirely. Rufous: clypeal lobe apically, propodeum on lateral faces; abdomen with first two segments wholly, all sternites, last segment entirely, and indistinct median fasciae on third to fifth tergites. Wings deep fuliginous.

Head with finer puncturation of upper front much closer; vertex and temples with closer, somewhat coarser puncturation. Thorax with mesopleura coarsely rugosopunctate. Propodeum more coarsely sculptured. Abdomen with tergites more coarsely punctured and more strongly constricted between the segments.

Allotype.—♂; Cocoa, Brevard County, Florida. July, 1944. (G. E. Bohart.) [Academy of Natural Sciences of Philadelphia.]

Male. Length 6 mm. Similar to female except as follows:

Livery the same but propodeum and abdomen entirely black save for red second segment of latter. Head, thorax and abdomen with coarser puncturation; propodeum more strongly and coarsely sculptured.

Paratypes.—6 females, 4 males, as follows:

FLORIDA: Cocoa, Brevard Co.; July, 1944; (G. E. Bohart): 6 ♀, 3 ♂; [A. N. S. P.; Morton Vogel]. Northern Florida, near St. Augustine; 1 ♂; [paratype of *Crabro excavatus* Fox; U. S. N. M.].

The paratypes agree in all essential particulars with the types, though there is some minor variation in the extent of the maculation. The male from St. Augustine has the abdominal fasciae almost yellow in color.

Ectemnius (Hypocrabro) excavatus (Fox)

Crabro rufipes Auctt., *nec* Lepeletier and Brullé, 1835.

Crabro excavatus Fox, Ent. News, III, p. 10, (1892); [♀, ♂; near St. Augustine, Florida].

Crabro banksi Rohwer, Ent. News, XX, p. 417, (1909); [♀; Glencarlyn, Virginia].

Three years after Fox described *excavatus*, he placed it as a synonym of *rufipes* Lepeletier and Brullé in his review of the Crabroninae of Boreal America. However, after a study of the lectotype of *excavatus* in the collection of the Academy of Natural Sciences of Philadelphia, and of the paratypes at the United States National Museum, I am convinced that Lepeletier and Brullé's name *rufipes* cannot be applied to this species.

Examination of the type of *Crabro banksi* Rohwer in the United States National Museum has revealed that it is only subspecifically different from *excavatus* Fox, the typical form of which is confined to peninsular Florida. Rohwer's name *banksi* may be applied to the atypical race of *excavatus*.

Ectemnius (Ectemnius) atriceps (Cresson)

Crabro atriceps Cresson, Proc. Ent. Soc. Phila., IV, p. 483, (1865); [♀; Mountain region, Colorado Territory; summer, 1864; James Ridings].

Crabro foxii Kincaid, Ent. News, XI, p. 356, (1900); [♂; Olympia, Washington]. (New synonymy.)

An examination of the lectotype of *Crabro foxii* Kincaid in the collection of the Academy of Natural Sciences of Philadelphia has convinced me that it represents the opposite sex of *atriceps* Cresson.

Ectemnius (Ectemnius) corrugatus (Packard)

Crabro corrugatus Packard, Proc. Ent. Soc. Phila., VI, p. 107, (1866); [♀; Western Virginia].

Crabro parvulus Packard, Proc. Ent. Soc. Phila., VI, p. 108, (1866); [♀; Colorado Territory]. (*nec* Herrich-Schaeffer, 1841.) (New synonymy.)

Crabro pauper Packard, Proc. Ent. Soc. Phila., VI, p. 95, (1866); [♂; Western Virginia; Brunswick, Maine]. (New synonymy.)

Crabro (Cuphopterus) operus Rohwer, Ent. News, XIX, p. 247, (1908); [♀; Beulah, New Mexico]. (New synonymy.)

Crabro (Xestocrabro) drymocallidis Rohwer, Ent. News, XIX, p. 255, (1908); [♂; Topaz Butte, Teller Co., Colorado; elevation about 9000 ft.; June 23, 1907; (S. A. Rohwer; at flowers of *Drymocallis fissa*)]. (New synonymy.)

After a careful study of Packard's types of *corrugatus, parvulus* and *pauper* in the Academy of Natural Sciences of Philadelphia and of Rohwer's *operus* and *drymocallidis*, I am convinced they are all one and the same species and have selected Packard's name *corrugatus* for the species.

Ectemnius (Ectemnius) dives (Lepeletier et Brullé)

Solenius dives Lepeletier et Brullé, Ann. Soc. Ent. France, III, p. 716, (1835).

Crabro (Xestocrabro) heraclei Rohwer, Ent. News, XIX, p. 253, (1908); [♂; Florissant, Colorado; July 7, 1907; (S. A. Rohwer; at flowers of *Heracleum lanatum*)]. (New synonymy.)

Ectemnius (Ectemnius) dives Pate, Bull. Brooklyn Ent. Soc., XL, p. 38, (1945); [synonymy].

An examination of the type of *Crabro heraclei* Rohwer in the collection of the United States National Museum has shown it to be the same as *dives* (L. & B.) [olim *montanus* Cresson seu *cristatus* Packard]. Consequently, *heraclei* must be added to the list of synonyms of this species which I published in 1945.

NOTULAE NATURAE

NUMBER 172 OF MARCH 29, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW SPECIES OF FOSSIL SHARK FROM NEW JERSEY

BY M. DOROTHY REED

Department of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia

The tooth upon which the species described below is founded was discovered in a boulder of marl picked up from the beach at Belmar, Monmouth County, New Jersey. The boulder resembled strongly the material of the Shark River formation, which is assigned to the Eocene.

Notidanion howellii new species Figs. 1 to 4.

The species is founded on a single lateral tooth from the upper jaw. The length is about 13 mm., the height from the lower margin of the root to the tip of the principal cone is about 7 mm., and the height of the principal cone above the root is about 4 mm.

The principal cone is preceded by a group of 3 or 4 denticles, the first of which is comparatively large, but all decrease rapidly in size as they approach the root, giving somewhat the effect of a miniature cockscomb.

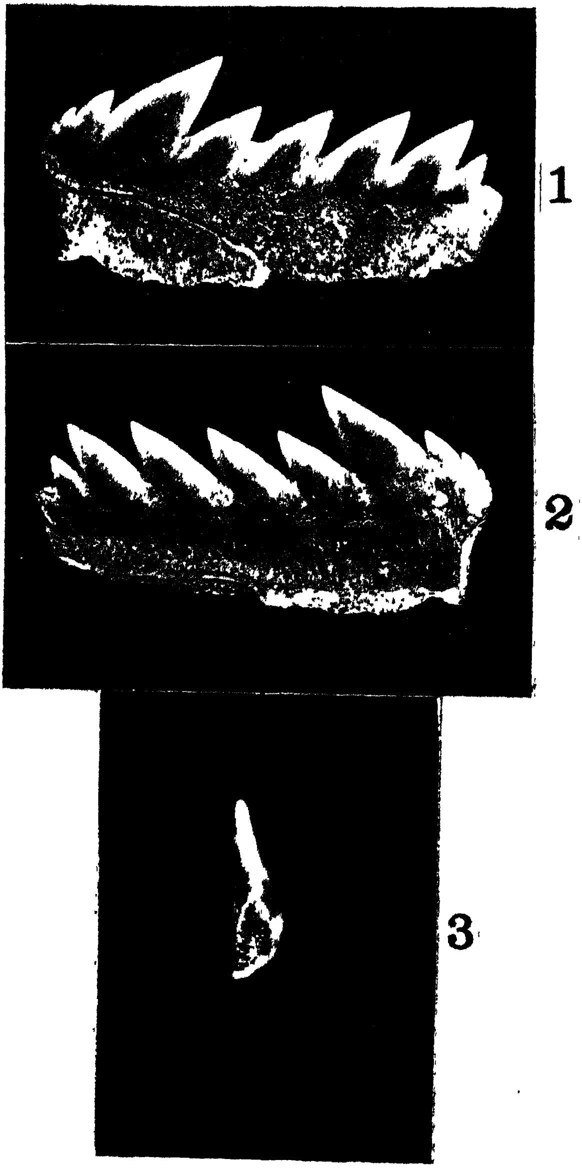
The principal cone is followed by four accessory cones which are all the same size, and a fifth accessory cone which is very small. There is an indication of a denticle at the extreme posterior end.

The cutting edges of the tooth are entire, and are so thin as to be almost translucent.

The tooth is similarly convex on both the inner and outer sides, and is well compressed.

The root is straight on the outer side, convex on the inner, with the base tapering to a thickness about equal to that at the base of the crown, so that in profile the root is roughly the shape of a half circle.

The tooth as a whole is very slightly twisted, but the cones and denticles are set straight on the root, and are not at all sigmoid.



Notidanion howellii new species Fig 1.—External view (× 4). Fig. 2.—Internal view (× 4). Fig. 3.—Posterior view (× 4).

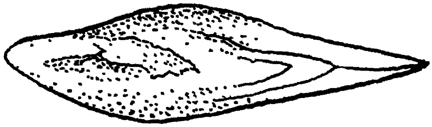
Affinities.—In size *Notidanion howellii* compares favorably with the Cretaceous and Early Tertiary species *Notidanion microdon* (Agassiz),[1] *Notidanion serratissimus* (Agassiz),[2] and *Notidanion tenuidens* (Leriche),[3] all of which were originally described as species of *Notidanus*. It differs from *Notidanion microdon* (Agassiz) and *Notidanion serratissimus* (Agassiz) in having the anterior denticles much larger, and in having a different number and arrangement of accessory cones. It differs from *Notidanion tenuidens* (Leriche) in the greater thickness of the root, more numerous anterior denticles and fewer accessory cones.

Location of type.—A.N.S.P. no. 15078.

Locality.—The boulder in which the tooth was found was part of a group of similar boulders collected from the beach between Spring Lake and Ocean Grove, New Jersey, and lying between low tide and storm tide marks.

Age.—Since the genus *Notidanion* ranges from the Jurassic to the Recent; and since material similar to that in which the specimen was found, and which was collected at the same time and place, has been bored since its consolidation—probably in Quaternary times—by *Zirphaea crispata* Linné, *Pholas truncata* Say and other boring mollusks, it is difficult to assign *Notidanion howellii* to a definite period.

However, the writer has been given the privilege of access to an unpublished note by Horace G. Richards, Associate Curator of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia, which shows that the majority of this material can be assigned to the Eocene. As the particular boulder in which the tooth was found did not show signs of having been reworked, it is probable that *Notidanion howellii* can be assigned to the Eocene period.



Notidanion howellii, new species. Fig 4.—Anterior view (× 7) (Drawn by Henry W. Fowler.)

---

[1] Agassiz, 1843, Recherches sur les Poissons Fossiles, Tome 3, p. 221, pl. 27, fig. 1 pl. 36, figs 1-2.

[2] Agassiz, 1843, Recherches sur les Poissons Fossiles, Tome 3, p. 222, pl. 36, figs. 4-5.

[3] Leriche, 1938, Poissons Fossiles de la Méditerranée Américaine, Abhandlungen der Schweizerischen Palaeontologischen Gesellschaft, Vol. 41, p. 3, pl. 1, figs 1-4 and 2 text figs.

NOTULAE NATURAE

NUMBER 173 OF MAY 1, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON BIRDS OF NORTHERN SIAM

BY H. G. DEIGNAN

Associate Curator of Birds, United States National Museum

In the author's "The Birds of Northern Thailand" (U. S. Nat. Mus. Bull., 186, 1945, p. 7), reference was made to a series of small collections from northern Siamese localities made by various Asiatic collectors during the years 1935-1938 in the interest of the Academy of Natural Sciences of Philadelphia. My friend, R. M. de Schauensee, in whose charge these materials lie, has recently invited me to study the collections, in order to place on record any information thence derived additional to that given in my long report on the area or in its preliminary papers.

The specimens of interest here come from six sites within the confines of my "Northern Thailand." These are: (1) Lampang, at lat. 18° 20′ N, long. 99° 30′ E; (2) Doi Ang Ka, at lat. 18° 35′ N, long. 98° 30′ E; (3) Doi Khun Tan, at lat. 18° 30′ N, long. 99° 20′ E; (4) Doi Pha Hom Pok, at lat. 20° 05′ N, long. 99° 10′ E; (5) Chiang Saen Kao, at lat. 20° 15′ N, long. 100° 05′ E; and (6) the Banchong Hills, at about lat. 20° 20′ N, long. 99° 50′ E.

A number of the birds, particularly from the Doi Pha Hom Pok collection, have already been noted in my book and require no further comment. Of the remainder, I shall mention here only those specimens which represent additions to the known avifauna, or of which the provenience, or date of capture, gives us new knowledge of more or less significance. For the student's convenience, a reference is given in each case to the page of my book on which the form in question is discussed in detail.

Species and subspecies now for the first time reported from northern Siam are:

Hirundo rustica tytleri Jerdon
Pericrocotus roseus divaricatus (Raffles)
Phylloscopus inornatus mandellii (Brooks)
Sturnus sinensis (Gmelin)

Each specimen from Doi Pha Hom Pok is labelled as coming from either 6,000 or 6,400 feet. It appears that these elevations are those of base camps rather than of the spots where the birds were shot, and it is thus possible that as applied to a given example they may be in error running to thousands of feet up or down. For this reason, although the elevations are listed, it is felt that small confidence may be placed in them.

During preparation of this paper, it was found necessary to examine specimens of certain woodpeckers and minivets deposited in the American Museum of Natural History and the various Siam-taken willow warblers in the Princeton Museum of Zoology, in addition to the mass of material in the Academy of Natural Sciences. For their courtesies, I wish to express my thanks to R. M. de Schauensee, Ernst Mayr, and Charles H. Rogers.

PHASIANIDAE

Arborophila rufogularis tickelli (Hume) (Deignan, p. 88.)

One male, Doi Pha Hom Pok, " 6,000 feet," January 25, 1938.

Arborophila brunneopectus brunneopectus (Blyth) (Deignan, p. 89.)

One male, Doi Pha Hom Pok, " 6,000 feet,'" January 30, 1938.

Gennaeus nycthemerus ripponi Bowdler Sharpe (Deignan, p. 94.)

Two males, one female, Doi Pha Hom Pok, " 6,400 feet," February 17-23, 1938.

Gallus gallus gallus (Linnaeus) (Deignan, p. 96.)

One male, two females, Doi Pha Hom Pok, " 6,000-6,400 feet," January 24-February 14, 1938.

Syrmaticus humiae burmannicus (Oates) (Deignan, p. 97.)

Two males, Doi Pha Hom Pok, " 6,400 feet," February 20-24, 1938.

COLUMBIDAE

Sphenurus sphenurus sphenurus (Vigors) (Deignan, p. 142.)

One male, Banchong Hills, April 17, 1935. One male, Doi Pha Hom Pok, " 6,400 feet," February 8, 1938.

The record from the Banchong Hills constitutes the first for the species in Chiang Rai Province.

Ducula badia griseicapilla Walden (Deignan, p. 149.)

Five specimens, Doi Pha Hom Pok, "6,000-6,400 feet," January 28-February 20, 1938.

Streptopelia tranquebarica humilis (Temminck) (Deignan, p. 154.)

One female, Banchong Hills, April 17, 1935.

This is the first record for the species in Chiang Rai Province.

CUCULIDAE

Cuculus micropterus micropterus Gould (Deignan, p. 160.)

One male (adult), Banchong Hills, April 3, 1935.

This is the first record for the species in Chiang Rai Province.

Cacomantis merulinus querulus Heine (Deignan, p. 163.)

Two males (adults), Banchong Hills, April 5, 1935.

This is the first record for the species in Chiang Rai Province.

Rhopodytes tristis longicaudatus (Blyth) (Deignan, p. 167.)

One male, one female, Doi Pha Hom Pok, "6,000 feet," January 29-31, 1938.

STRIGIDAE

Otus asio condorensis Boden Kloss (Deignan, p. 175.)

Female (adult), Lampang, April 30, 1935.

This is the first record for the species in Lampang Province.

Ninox scutulata burmanica Hume (Deignan, p. 180).

One male, Banchong Hills, April 17, 1935.

This is the first record for the species in Chiang Rai Province.

CAPRIMULGIDAE

Caprimulgus macrurus ambiguus Hartert (Deignan, p. 185.)

One female, Doi Pha Hom Pok, "6,400 feet," February 5, 1938.

ALCEDINIDAE

Ramphalcyon capensis burmanica (Bowdler Sharpe) (Deignan, p. 200.)

Unsexed (adult), Lampang, May 2, 1935.

This is the first record for the species in Lampang Province.

MEROPIDAE

Merops superciliosus philippinus Linnaeus (Deignan, p. 205.)

Male (adult), Lampang, April 24, 1935.

This is the first record for the species in Lampang Province.

Merops orientalis birmanus Neumann (Deignan, p. 206.)

One male, one female, Doi Pha Hom Pok, " 6,400 feet," February 17, 1938.

Nyctiornis athertoni (Jardine and Selby) (Deignan, p. 209.)

One male, Doi Pha Hom Pok, " 6,000 feet," January 31, 1938.

UPUPIDAE

Upupa epops longirostris Jerdon (Deignan, p. 213.)

One male, one female, Doi Pha Hom Pok, " 6,000-6,400 feet," January 30-February 12, 1938.

CAPITONIDAE

Cyanops franklinii ramsayi (Walden) (Deignan, p. 224.)

Five specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 21-February 3, 1938.

Cyanops asiatica davisoni (Hume) (Deignan, p. 226.)

Seven specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 30-February 24, 1938.

PICIDAE

Picus chlorolophus burmae R. Meinertzhagen (Deignan, p. 234.)

Two males, Doi Pha Hom Pok, " 6,000-6,400 feet," January 19- February 23, 1938.

Picus flavinucha lylei (Boden Kloss) (Deignan, p. 236.)

Three males, two females, Doi Pha Hom Pok, " 6,000-6,400 feet," January 25-February 24, 1938.

Blythipicus pyrrhotis pyrrhotis (Hodgson) (Deignan, p. 239.)

One male, one female, Doi Pha Hom Pok, " 6,000-6,400 feet," January 25-February 13, 1938.

Dryobates atratus (Blyth) (Deignan, p. 244.)

Five specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 20-February 11, 1938.

Dryobates canicapillus canicapillus (Blyth) (Deignan, p. 246.)

Two males, two females, Doi Pha Hom Pok, " 6,000-6,400 feet," January 22-February 14, 1938.

This small series have the wing length 85.2, 90, and 91.1 mm., against 79.3-85.8 mm. in *canicapillus* from northern Siam, and 97-102 mm. in *obscurus* from Yunnan and Upper Burma. They have the streaks of the underparts strongly marked as in both *canicapillus* and *obscurus,* but on the paler fulvous ground-color of *canicapillus.* They have rather more white on the upperparts, especially on the interscapular region and wing coverts, than appears in *obscurus,* rather less than in *canicapillus.* Finally, the upper tail coverts are not wholly black as in *obscurus,* but, in two specimens, as strongly white-barred as in *canicapillus,* in the other two, obsolescently white-barred.

Since the Pha Hom Pok birds fall between *canicapillus* and *obscurus,* but somewhat nearer the former, they may be most correctly represented as *Dryobates canicapillus canicapillus* > *obscurus.*

Picumnus innominatus malayorum Hartert (Deignan, p. 252.)

Three males, one female, Doi Pha Hom Pok, " 6,600-6,400 feet," January 26-February 18, 1938.

Sasia ochracea querulivox Stuart Baker (Deignan, p. 253.)

One male, one female, Doi Pha Hom Pok, " 6,000-6,400 feet," January 25-February 15, 1938.

EURYLAIMIDAE

Psarisomus dalhousiae dalhousiae (Jameson) (Deignan, p. 255.)

One male, one female, Doi Pha Hom Pok, " 6,400 feet," February 19, 1938.

Serilophus lunatus lunatus (Gould) (Deignan, p. 257.)

One male, one female, Doi Pha Hom Pok, " 6,400 feet," February 23-24, 1938.

HIRUNDINIDAE

Hirundo rustica gutturalis Scopoli (Deignan, p. 267.)

Female (adult), Lampang, April 24, 1935.

This is the first record for the species in Lampang Province and the latest spring date for the subspecies in northern Siam.

Hirundo rustica tytleri Jerdon

(Chestnut-bellied House Swallow)

Hirundo Tytleri Jerdon, Birds of India, vol. 3, 1864, p. 870 (Dacca, Bengal)

An adult male collected at Lampang, April 30, 1935, is the first example of the Kamchatkan house swallow taken within the limits of northern Siam.

This race differs from *H. r. gutturalis* only in having the entire underparts (with the exception of the steel-blue gorget) of the same chestnut hue as the throat.

The Philadelphia specimen, A.N.S.P. No. 123294, has the underparts a rather less rich chestnut than topotypical *tytleri* and might be more accurately represented as *tytleri* > *gutturalis.*

In "The Birds of Northern Thailand," this form would fall between *Hirundo rustica gutturalis* and *Hirundo smithii filifera* (p. 268).

CAMPEPHAGIDAE

Pericrocotus solaris solaris Blyth (Deignan, p. 277.)

One male, three females, Doi Pha Hom Pok, " 6,000-6,400 feet," February 1-23, 1938.

Pericrocotus roseus divaricatus (Raffles)

(NORTHERN GRAY MINIVET)

Lanius divaricatus Raffles, Trans. Linn. Soc. London, vol. 13, 1822, p. 305 (Singapore)

The only northern Siamese specimen of this minivet are two males taken by de Schauensee's collectors at Chiang Saen Kao, April 20, 1935, and two females taken by the same party at Lampang on April 29 of the same year. It may prove to be an uncommon but regular migrant through the more eastern provinces.

The adult male differs from the corresponding age and sex of *P. r. cantonensis* by having the posterior half of the crown, the posterior ear coverts, the nape, and sometimes the uppermost back black; the mantle, lower back,, rump, and upper tail coverts deep ashy gray, without the least brownish suffusion; the underparts pure white. The adult female is perhaps not distinguishable in life from that of *cantonensis*, but may be known in the hand by its having the lower back, rúmp, and upper tail coverts of the same ashy gray as the crown and mantle, with no brownish wash.

In " The Birds of Northern Thailand," this form would fall between *Pericrocotus roseus cantonensis* and *Pericrocotus peregrinus vividus* (p. 279).

Coracina novaehollandiae siamensis (Stuart Baker) (Deignan, p. 286.)

One male, Doi Pha Hom Pok, " 6,400 feet," February 11, 1938.

DICRURIDAE

Dicrurus leucophaeus hopwoodi Stuart Baker (Deignan, p. 288.)

Two females, Doi Pha Hom Pok, " 6,000-6,400 feet," January 30- February 21, 1938.

Chaptia aenea aenea (Vieillot) (Deignan, p. 293.)

Three males, one female, Doi Pha Hom Pok, " 6,400 feet," February 6-13, 1938.

Bhringa remifer tectirostris Hodgson (Deignan, p. 294.)

One male, two females, Doi Pha Hom Pok, " 6,400 feet," February 12-16, 1938.

ORIOLIDAE

Oriolus chinensis tenuirostris Blyth (Deignan, p. 296.)

One male (immature), Lampang, April 27, 1935. One female, Doi Pha Hom Pok, " 6,400 feet," February 17, 1938.

The record from Lampang constitutes the first for the subspecies east of the Khun Tan range and the latest spring date for northern Siam.

Oriolus chinensis diffusus Bowdler Sharpe (Deignan, p. 297.)

One male (immature), one female (adult), Lampang, April 27-28, 1935.

These are the latest spring examples known from northern Siam, with the exception of Gyldenstolpe's Khun Tan specimen of May 1, 1914.

Oriolus traillii traillii (Vigors) (Deignan, p. 298.)

One male, one female, Doi Pha Hom Pok, " 6,000 feet," January 23-28, 1938.

CORVIDAE

Garrulus glandarius leucotis Hume (Deignan, p. 301.)

One male, Doi Pha Hom Pok, " 6,000 feet," January 24, 1938.

Crypsirina formosae assimilis (Hume) (Deignan, p. 306.)

Four males, one female, Doi Pha Hom Pok, " 6,000-6,400 feet," January 23-February 19, 1938.

In " The Birds of Northern Thailand," p. 307, I surmised that " it is probable that the population of Doi Pha Hom Pok are . . . of the more northern form," that is *himalayensis;* this useful series shows that in fact no distinction can be made between Pha Hom Pok specimens and those from mountains farther south.

PARADOXORNITHIDAE

Paradoxornis gularis transfluvialis (Hartert) (Deignan, p. 309.)

Two males, Doi Pha Hom Pok, " 6,000-6,400 feet," January 27-February 24, 1938.

PARIDAE

Parus major nubicolus de Schauensee (Notulae Naturae, No. 169, p. 8).

One male, Doi Pha Hom Pok, " 6,000 feet," January 23, 1938. Replaces *P. m. altarum* La Touche (Deignan, p. 311).

Parus xanthogenys subviridis Blyth (Deignan, p. 312.)

Six specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 23-February 19, 1938.

SITTIDAE

Sitta magna magna Wardlaw Ramsay (Deignan, p. 314.)

Three males, Doi Pha Hom Pok, "6,400 feet," January 22-February 19, 1938.

Sitta europaea montium La Touche (Deignan, p. 315.)

Nine specimens, Doi Pha Hom Pok, "6,000-6,400 feet," January 25-February 23, 1938.

Sitta frontalis corallina Hodgson (Deignan, p. 318.)

One male, one female, Doi Pha Hom Pok, "6,400 feet," January 23-February 6, 1938.

CERTHIIDAE

Certhia discolor shanensis Stuart Baker (Deignan, p. 319.)

One male, one female, Doi Pha Hom Pok, "6,400 feet," February 10, 1938.

PYCNONOTIDAE

Aegithina tiphia tiphia (Linnaeus) (Deignan, p. 322.)

One male, Doi Pha Hom Pok, "6,400 feet," February 8, 1938.

Chloropsis hardwickii hardwickii Jardine and Selby (Deignan, p. 326.)

One male, Doi Pha Hom Pok, "6,400 feet," February 4, 1938.

Spizixos canifrons Blyth (Deignan, p. 327.)

Fourteen specimens, Doi Pha Hom Pok, "6,000-6,400 feet," January 19-February 23, 1938.

Pycnonotus striatus paulus (Bangs and Phillips) (Deignan, p. 333.)

Two males one female, Doi Pha Hom Pok, "6,400 feet," February 3-16, 1938.

Pycnonotus flavescens vividus (Stuart Baker) (Deignan, p. 335.)

Seven specimens, Doi Pha Hom Pok, "6,000-6,400 feet," January 19-February 1, 1938.

Microscelis flavala hildebrandti (Hume) (Deignan, p. 342.)

Six specimens, Doi Pha Hom Pok, "6,000 feet," January 20-29, 1938.

Microscelis madagascariensis concolor (Blyth) (Deignan, p. 343.)

One male, Doi Pha Hom Pok, "6,400 feet," February 12, 1938.

TIMALIIDAE

Cutia nipalensis nipalensis Hodgson (Deignan, p. 346.)

One male, one female, Doi Pha Hom Pok, "6,400 feet," February 9, 1938.

Pteruthius erythropterus aeralatus Blyth (Deignan, p. 349.)

Six specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 25-February 22, 1938.

Mesia argentauris galbana Mayr and Greenway (Deignan, p. 350.)

Nineteen specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 22-February 16, 1938.

Liocichla ripponi (Oates) (Deignan, p. 352.)

Fifteen specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 1-February 22, 1938.

Garrulax pectoralis meridionalis Robinson and Boden Kloss (Deignan, p. 358.)

Seven specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 29-February 24, 1938.

Garrulax strepitans strepitans Blyth (Deignan, p. 361.)

One male, Doi Pha Hom Pok, " 6,000 feet," January 28, 1938.

Gampsorhynchus rufulus torquatus Hume (Deignan, p. 362.)

One male, Doi Pha Hom Pok, " 6,400 feet," February 20, 1938.

Actinodura egertoni ramsayi (Walden) (Deignan, p. 363.)

Twelve specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 25-February 19, 1938.

Heterophasia picaoides cana (Riley) (Deignan, p. 364.)

Two males, Doi Pha Hom Pok, " 6,400 feet," February 21-23, 1938.

Leioptila capistrata melanoleuca (Blyth) (Deignan, p. 365.)

Seven specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 23-February 13, 1938.

Siva castaniceps striata (Blyth) (Deignan, p. 370.)

One female, Doi Pha Hom Pok, " 6,400 feet," February 21, 1938.

Alcippe morrisonia laotiana Delacour (Deignan, p. 376.)

Seven specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 23-February 24, 1938.

Pellorneum albiventre cinnamomeum (Rippon) (Deignan, p. 379.)

One male, Doi Pha Hom Pok, " 6,000 feet," January 24, 1938.

Pomatorhinus erythrogenys celatus Deignan (Deignan, p. 390.)

Fifteen specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 19-February 22, 1938.

Pomatorhinus schisticeps ripponi Harington (Deignan, p. 393.)

Twelve specimens, Doi Pha Hom Pok, "6,000-6,400 feet," January 24-February 16, 1938.

TURDIDAE

Myophonus caeruleus caeruleus (Scopoli) (Deignan, p. 403.)

One male, one female, Doi Pha Hom Pok, "6,400 feet," February 18-20, 1938.

Myophonus caeruleus eugenei (Hume) (Deignan, p. 404.)

One male, Doi Pha Hom Pok, "6,000 feet," January 23, 1938.

Phoenicurus leucocephalus Vigors (Deignan, p. 408.)

One female, Doi Pha Hom Pok, "6,400 feet," February 5, 1938.

Phoenicurus auroreus leucopterus Blyth (Deignan, p. 409).

Two males, two females, Doi Pha Hom Pok, "6,000-6,400 feet," January 22-February 5, 1938.

Rhodophila ferrea (G. R. Gray) (Deignan, p. 410.)

Two males, Doi Pha Hom Pok, "6,000 feet," January 26-29, 1938.

Saxicola caprata burmanica Stuart Baker (Deignan, p. 411.)

One male, Doi Pha Hom Pok, "6,400 feet," February 24, 1938.

Saxicola torquata stejnegeri (Parrot) (Deignan, p. 412.)

Three specimens, Doi Pha Hom Pok, "6,000-6,400 feet," January 19-February 18, 1938.

Tarsiger cyanurus rufilatus (Hodgson) (Deignan, p. 417.)

Three males (adult), Doi Pha Hom Pok, "6,000-6,400 feet," January 21-February 4, 1938.

Myiomela leucura leucura (Hodgson) (Deignan, p. 418.)

Two males, one female, Doi Pha Hom Pok, "6,000-6,400 feet," January 28-February 20, 1938.

Monticola rufiventris (Jardine and Selby) (Deignan, p. 424.)

One male, two females, Doi Pha Hom Pok, "6,000 feet," January 22-23, 1938.

MUSCICAPIDAE

Siphia parva albicilla (Pallas) (Deignan, p. 440.)

One "male," Lampang, April 25, 1935. One male, Doi Pha Hom Pok, "6,000 feet," January 19, 1938.

The bird from Lampang is the latest spring specimen known from our area, except for an abnormally belated example seen by me on Doi Suthep on May 30, 1931. Since no sign of orange yet appears on the chin and throat, the bird is almost certainly a female.

Siphia hodgsonii Verreaux (Deignan, p. 442.)

Eight specimens, Doi Pha Hom Pok, "6,000-6,400 feet," January 22-February 24, 1938.

Siphia melanoleuca melanoleuca (Blyth) (Deignan, p. 443)

Two males, one female, Doi Pha Hom Pok, "6,400 feet," February 7-20, 1938.

Cyornis banyumas whitei Harington (Deignan, p. 449.)

Two males, Doi Pha Hom Pok, "6,400 feet," February 11-17, 1938.

Eumyias thalassina thalassina (Swainson) (Deignan, p. 452.)

Seven specimens, Doi Pha Hom Pok, "6,000-6,400 feet," January 27-February 24, 1938.

Niltava sundara denotata Bangs and Phillips (Deignan, p. 455.)

Five specimens, Doi Pha Hom Pok, "6,000-6,400 feet," January 20-February 7, 1938.

Niltava grandis grandis (Blyth) (Deignan, p. 456.)

Two males, Doi Pha Hom Pok, "6,000 feet," January 25-28, 1938.

Rhipidura albicollis albicollis (Vieillot) (Deignan, p. 461.)

One male, Doi Pha Hom Pok, "6,000 feet," January 28, 1938.

SYLVIIDAE

Phylloscopus schwarzi (Radde) (Deignan, p. 472.)

One female, Doi Pha Hom Pok, "6,400 feet," February 8, 1938.

Phylloscopus inornatus inornatus (Blyth) (Deignan, p. 473.)

One male, Chiang Saen Kao, April 19, 1935. One female, Lampang, April 25, 1935.

These are the latest spring specimens known from our area.

Phylloscopus inornatus mandellii (Brooks)

Szechwanese Inornate Willow Warbler

Reguloides Mandellii Brooks, Stray Feathers, vol. 8, 1879, pp. 389-390 (Darjiling, Bengal.)

R. M. de Schauensee has brought to my attention that, among the several specimens originally reported by him as *Phylloscopus humii praemium*

(Proc. Acad. Nat. Sci. Phil., vol. 81, 1929, p. 585) and as a whole placed by me in synonymy with *P. i. inornatus* (p. 473), there is a male, A.N.S.P. No. 87267, collected at Chiang Rai, January 7, 1929, which is inseparable from a long series of *P. i. mandellii* taken by the Second Dolan Expedition in western China and eastern Tibet. Since the " Siam " specimen recorded by Ticehurst (Systematic review of the genus *Phylloscopus,* 1938, p. 105) evidently came from southwestern Siam (see map, *ibid.,* p. 102), this bird is the first recorded from northern Siam and the second from the Kingdom as a whole.

From *P. i. inornatus,* fresh-plumaged *mandellii* may be known by its having the upperparts a bright brownish olive-green and the underparts much more strongly washed with greenish yellow.

In " The Birds of Northern Thailand," this form would fall between *Phylloscopus inornatus inornatus* and *Phylloscopus proregulus chloronotus* (p. 474).

Phylloscopus maculipennis maculipennis (Blyth) (Deignan, p. 475.)

One unsexed (juvenile), Doi Ang Ka, 8,400 feet, April 24, 1931.

This specimen, collected by me and now in the Princeton Museum of Zoology, shows that the ashy-throated willow warbler is resident at the summit of at least one of our high mountains.

Phylloscopus borealis borealis (Blasius) (Deignan, p. 475.)

One male, one female, Banchong Hills, April 5, 1935.

The race was previously known from northern Siam by a single specimen taken in Phrae Province. Each of these examples is undergoing prenuptial molt of the remiges and rectrices.

Phylloscopus reguloides claudiae (La Touche) (Deignan, p. 479.)

Adult male, A.N.S.P. No. 82676, Doi Suthep, 4,500 feet, March 18, 1928. Adult male, A.N.S.P. No. 113925, Doi Chiang Dao, 5,000 feet, January 16, 1933. Adult male, A.N.S.P. No. 113928, Doi Suthep, 5,500 feet, February 5, 1933. Adult female, A.N.S.P. No. 113929, Doi Suthep, 5,000 feet, February 27, 1933. Adult male, A.N.S.P. No. 113930, Doi Suthep, 5,500 feet, March 1, 1933. Adult male, A.N.S.P. No. 113926, Doi Suthep, 3,000 feet, December 12, 1932. Adult male, A.N.S.P. No. 113927, Doi Suthep, 5,000 feet, February 28, 1933. Adult male, P.M.Z. (original number H.G.D. 451), Doi Suthep, 3,500 feet, December 12, 1931. Adult female, P.M.Z. (original number H.G.D. 220), Doi Ang Ka, 5,500 feet, April 8, 1931.

No. 82676 was erroneously included with a series of *P. i. inornatus* reported by de Schauensee under the name *Phylloscopus superciliosus superciliosus* (Proc. Acad. Nat. Sci. Phila., vol. 80, 1928, p. 563). My reference (p. 473) to de Schauensee's paper should therefore be divided between *P. i. inornatus* (p. 473) and *P. r. claudiae* (p. 479).

The six specimens with numbers from 113925 to 113930 were originally reported by de Schauensee as *Phylloscopus occipitalis coronatus* (Proc. Acad. Nat. Sci. Phila., vol. 86, 1934, p. 230), and the reference was placed by me in synonymy with *P. c. coronatus* (p. 478). The four first listed above are true *P. r. claudiae;* the two others are good examples of the intermediate population discussed by Ticehurst on p. 171 of his Systematic review of the genus *Phylloscopus,* and might best be represented as *Phylloscopus reguloides assamensis* ≶ *claudiae* (*cf.* Deignan, p. 479, under *P. r. assamensis*).

The two birds from Princeton have not previously been reported and are listed here to complete the roster of known Siamese specimens of *P. r. claudiae.*

The Princeton female had the irides brown; the maxilla blackish brown; the mandible yellow, tipped blackish brown; the interior of the mouth bright yellow; the feet, toes, and claws horny brown; the soles bright yellow.

P. r. claudiae is now known to occur in northern Siam from November 23 (Ban Samoeng) to April 8 (Doi Ang Ka); *P. r. assamensis* ≶ *claudiae,* from December 12 (Doi Suthep) to February 28 (Doi Suthep).

N.B. With the removal of the de Schauensee record for *Phylloscopus coronatus coronatus* to its proper place under *P. r. claudiae, P. c. coronatus* (p. 478) is known from northern Siam by only one specimen (Ban Sa-iap), although it might be expected to winter there in some numbers.

Acrocephalus bistrigiceps Swinhoe (Deignan, p. 485.)

One male, Banchong Hills, April 4, 1935.

This record constitutes the first for the species in Chiang Rai Province.

Orthotomus cucullatus coronatus Blyth (Deignan, p. 489.)

One unsexed, Doi Pha Hom Pok, " 6,000 feet," January 26, 1938.

Prinia rufescens rufescens Blyth (Deignan, p. 492.)

One male, Banchong Hills, April 2, 1935.

Prinia atrogularis erythropleura (Walden) (Deignan, p. 495.)

Seven specimens, Doi Pha Hom Pok, " 6,000-6,400 feet," January 30-February 21, 1938.

Cettia squameiceps (Swinhoe) (Deignan, p. 498.)

One male, Doi Pha Hom Pok, " 6,000 feet," January 31, 1938.

MOTACILLIDAE

Motacilla cinerea melanope Pallas (Deignan, p. 505.)

One female, Doi Pha Hom Pok, " 6,400 feet," February 12, 1938.

LANIIDAE

Lanius schach tricolor Hodgson (Deignan, p. 516.)

One male, two females, Doi Pha Hom Pok, " 6,000-6,400 feet," January 29-February 19, 1938.

Lanius schach nipalensis Hodgson (Deignan, p. 518)

One male, one female, Doi Pha Hom Pok, " 6,000-6,400 feet," January 21-February 7, 1938.

STURNIDAE

Sturnus sinensis (Gmelin)

White-shouldered Myna

[*Oriolus*] *sinensis* Gmelin, Systema naturae, vol. 1, pt. 1, 1788, p. 394 (China.)

One male and three females, collected for de Schauensee at Lampang, between April 27 and 29, 1935, are the first examples of this beautiful starling known from northern Siam. Since the species is a common winter visitor to the more southern portions of the Kingdom, it may prove to be a regular migrant through our more eastern provinces.

The habits of this bird are much like those of *Sturnus m. nemoricola,* the ashy-headed myna, and the two forms are likely to be found associated in the same flowering trees.

The white-shouldered myna is strongly subject to erythrism, and the reddest specimens look so different from the whitest that one might mistake them for distinct species. An adult male, taken in July at Fuchow in China, has the hindcrown, nape, and mantle soft gray, this color changing to silvery gray on the forecrown and front, and to silvery gray, with a faint rufescent wash, on the upper tail coverts; the remiges black, the primaries very faintly glossed with purple, the secondaries strongly glossed with bronze-green; the scapulars and upper wing coverts pure white, to form a large and conspicuous shoulder patch; the rectrices black, glossed with bronze-green, with an outwardly increasingly broad white tip; the breast pale gray (with silvery-gray shaft streaks), this color fading to silvery gray on the throat and chin and on the flanks, abdomen, and under-tail coverts; the bend of the wing, the under wing coverts, and the axillaries pure white. The most erythristic specimen seen, an adult male taken in February at Singapore, differs from that just described in having the entire plumage (with the exception of the remiges and the glossed portion of the rectrices) overlaid with rufous-orange, this color faint on the nape, mantle, and breast, and toward the bases of the scapulars, upper and under wing coverts, and axillaries, but strikingly brilliant everywhere else. Between the two extremes occur all possible intergrades, and the material before me seems to show that the plumages cannot be definitely correlated with age or season. Adult females resemble the males but apparently never have the grays and whites so clear and unsullied. The immature birds have the scapulars gray like the back, the median upper wing coverts white, and the others black; they may be most easily distinguished from *S. m. nemoricola* by their black, not silvery-gray, central rectrices.

In "The Birds of Northern Thailand," this form would fall between *Sturnus malabaricus nemoricola* and *Sturnus contra floweri* (p. 529).

NECTARINIIDAE

Aethopygà saturata sanguinipectus Walden (Deignan, p. 535.)

One male, one female, Doi Pha Hom Pok, "6,400 feet," February 6-11, 1938.

Aethopyga gouldiae dabryii (Verreaux) (Deignan, p. 536.)

Five specimens, Doi Pha Hom Pok, "6,000-6,400 feet," January 19-February 11, 1938.

Arachnothera magna magna (Hodgson) (Deignan, p. 543.)

One male, one female, Doi Pha Hom Pok, "6,400 feet," February 4-10, 1938.

FRINGILLIDAE

Carpodacus erythrinus roseatus (Blyth) (Deignan, p. 565.)

Two females, Doi Pha Hom Pok, "6,000-6,400 feet," January 22-February 15, 1938.

Emberiza rutila Pallas (Deignan, p. 569.)

Two males, Doi Pha Hom Pok, "6,400 feet," January 26-27, 1938.

NOTULAE NATURAE

NUMBER 174 OF MAY 10, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON TWO COLLECTIONS OF BIRDS FROM NORTH-CENTRAL SIAM

BY H. G. DEIGNAN

Associate Curator of Birds, United States National Museum

During the rainy season of 1935 a group of Asiatic collectors, in the employ of R. M. de Schauensee, made small collections of birds at two obscure localities in the extreme north of the central Siamese plain. The period from August 23 to August 31 was spent at Ban Mae Phun ("Meh Poon" on the labels); that from September 4 to September 17, at Ban Mae Lam Phan ("Meh Rampan" on the labels).

Ban Mae Phun is a village on the lower Mae Phun, a small tributary of the river Mae Yom (which it enters from the northeast at about lat. 17° 40′ N. long. 99° 42′ E).

Ban Mae Lam Phan is a village on the Huai Mae Lam Phan (a feeder of the Mae Yom from the west). Its exact position cannot be given, but it probably lies somewhere along the highway connecting Rahaeng and Sukhothai; the Lam Phan stream is named on the Siam Royal Survey Department's sheet E47-16 at lat. 17° 10′ N, long. 99° 25′ E.

No really unexpected species appears in either collection, but since the districts had not previously been visited by any ornithologist, it seems well to place the findings on record as an aid to students of the ranges of subspecies. It is of interest to find that, at Mae Phun, which is situated only about seven minutes south of the boundary of Deignan's "Northern Thailand," but at the *foot* of the northern plateau, we find, not the northern *Dicrurus leucophaeus mouhoti*, but the southern *D. l. bondi;* not the northern *Dissemurus paradiseus rangoonensis*, but the southern *D. p. paradiseus*.

My thanks are due R. M. de Schauensee, whose suggestion it was that I work up this material, which is now in his charge at the Academy of Natural Sciences of Philadelphia.

MAE PHUN

Rhopodytes tristis longicaudatus (Blyth)

Male, August 24, 1935 (A.N.S.P. No. 124197).

Glaucidium cuculoides brügeli (Parrot)

Male, August 31, 1935 (A.N.S.P. No. 124201).

Alcedo meninting coltarti Stuart Baker

Male, August 24, 1935 (A.N.S.P. No. 124226). Female, August 23, 1935 (A.N.S.P. No. 124227).

These specimens differ in minor details from two Chiang Mai birds believed to represent *coltarti,* and it is possible that the population of the Indo-Chinese countries east of the Khun Tan chain will eventually require separation, but more material must be seen before anything certain can be known on this point.

Merops leschenaulti leschenaulti Vieillot

Female, August 31, 1935 (A.N.S.P. No. 124223).

Xantholaema haemacephala indica (Latham)

Male, August 28, 1935 (A.N.S.P. No. 124214). Female, August 28, 1935 (A.N.S.P. No. 124213).

Picus canus hessei Gyldenstolpe

Female, August 30, 1935 (A.N.S.P. No. 124230).

Pitta brachyura moluccensis (P. L. S. Müller)

Female (juvenile), August 24, 1935 (A.N.S.P. No. 124224).

Pericrocotus speciosus elegans (McClelland)

Male, August 28, 1935 (A.N.S.P. No. 124265). Male, August 29, 1935 (A.N.S.P. No. 124266). Female, August 24, 1935 (A.N.S.P. No. 124267). Female, August 29, 1935 (A.N.S.P. No. 124268).

Pericrocotus peregrinus vividus Stuart Baker

Male, August 23, 1935 (A.N.S.P. No. 124269). Male, August 29, 1935 (A.N.S.P. No. 124270). Male, August 31, 1935 (A.N.S.P. No. 124271).

Tephrodornis pondiceriana thai Boden Kloss and Chasen

Female, August 29, 1935 (A.N.S.P. No. 124274).

Dicrurus leucophaeus bondi de Schauensee

Female, August 31, 1935 (A.N.S.P. No. 124303).

Dicrurus bondi (Proc. Acad. Nat. Sci. Phila., 89: 337, 1937) was based upon three adult male specimens from Khulu and Channuman, localities near the Mae Khong in Ubon Province. Of this small series, two (including the type) are unusually pale, while the third is slightly darker; all have in common a notably short tail and the lores and frontal region merely nigrescent rather than black.

The discovery that one specimen from Mae Phun and another from Mae Lam Phan cannot be separated by any character from the darker paratype of *bondi* has led me to reexamine all of the numerous pale ashy drongos in the United States National Museum, with the following results:

a. *All* summer-taken birds from Siam south of the northern plateau are *bondi*, with tail length of nonmolting adults (pygostyle to end of outermost rectrix) ranging from 112.1 to 130.1 mm.;

b. *All* summer-taken birds from the northern plateau are *mouhoti*, with tail length of nonmolting adults ranging from 139 to 151.2 mm., the general coloration averaging rather darker, and the lores and frontal region distinctly blackened;

c. Every specimen possessing the characters of *mouhoti*, but coming from within the breeding range of *bondi*, has been collected in winter.

In Upper Burma and Yunnan occurs an extreme form of the species, in which the tail length of nonmolting adults ranges from 150 to 164 mm., the general coloration is still darker than that of *mouhoti*, and the lores and frontal region are truly black. Individuals of this long-tailed, saturate race occur in winter within the breeding range of *mouhoti*; they may be known as *hopwoodi*.

Boden Kloss (Journ. Nat. Hist. Soc. Siam, 4: 54-56, 1921) discussed the forms of these birds occurring in southern Siam and correctly noted the existence of a " larger and, on the whole, darker " race, as well as a " paler, smaller " race. His material was, for the most part, winter-taken, and this led him into the error of composite series; moreover, not having seen true *hopwoodi*, he used the name *hopwoodi* for the birds I call *mouhoti*, and *mouhoti* for those I call *bondi*.

If Boden Kloss, Delacour, and others were right in believing *mouhoti* to be the name applicable to the smallest and palest race of the extreme south, and *hopwoodi* the proper name for the intermediate, the most northern form would be left without a name. But *hopwoodi*, when it was first described, was said to range across northern Burma into Yunnan and to possess just the characters I find in the northernmost population; there can thus be little doubt that that population must bear Stuart Baker's name.

The name *mouhoti* can only be applicable to the intermediate birds, for the outermost rectrices of the type specimen measured 5¾ inches [= 146 mm.], and Walden noted that it was darker than *leucophaeus* of Java; the fact that it was collected in Cambodia (within the breeding range of *bondi*) merely indicates that it was a nonbreeding wanderer.

The name "*rocki*" was given by Riley (Proc. Biol. Soc. Washington, 53: 132, 1940) to a series of breeding birds from southern Annam; comparison of "*rocki*" with *bondi* shows that, in series, the two are quite inseparable.

The paleness of the *type* of *bondi* has led Mayr to assume (*in epistola*) that it is a migratory form from China, where it should breed in geographical proximity to the similarly pale *D. l. leucogenis*. The range of individual color variation shown in *bondi* is, however, exactly paralleled in *mouhoti* and *hopwoodi*, and it is almost coincidental that the type of *bondi* is one of the palest examples of the palest of the three races. Boden Kloss (*loc. cit.*, p. 55) observes that, in his "paler, smaller" series, there are "several examples which have the under-wing coverts spotted with white and the vents and under-tail coverts greyish-white, and they are altogether paler than the others: on the other hand some adults in much worn plumage are quite as dark as the darkest of Javanese birds." *D. l. bondi* is in fact nearest *D. l. leucophaeus* of Java, a similarly light-colored, short-tailed race. Indeed the only differences I can find between the two are the more blackened frontal region of *leucophaeus* (like that of *mouhoti*) and the tendency of *leucophaeus* to develop a slightly longer, more robust bill.

The range of *bondi* is now known to extend from southern (and central?) Annam across Siam at least to the borders of Deignan's "Western Thailand" (U. S. Nat. Mus. Bull., 186: 23, map 4, 1945), so far as this lies south of lat. 17° 47′ N; to the south it reaches, at any rate in winter, to the Isthmus of Kra.

D. l. mouhoti occurs in winter at least as far southeast as Ko Chang (lat. 12° 00′ N, long. 102° 30′ E), as far southwest as the Isthmus of Kra. It should be mentioned, however, that the two specimens of "*mouhoti*" reported by Riley (U. S. Nat. Mus. Bull., 172: 281, 1938) from Tanjong Badak and Maliwun in southern Tenasserim are examples of the migratory Chinese race *salangensis*.

Chaptia aenea aenea (Vieillot)

Male, August 29, 1935 (A.N.S.P. No. 124305).

Dissemurus paradiseus paradiseus (Linnaeus)

Male (adult), August 26, 1935 (A.N.S.P. No. 124306). Male (juvenile), August 26, 1935 (A.N.S.P. No. 124307).

Oriolus xanthornus xanthornus (Linnaeus)

Male (juvenile), August 28, 1935 (A. N. S. P. No. 124240). Female, August 30, 1935 (A.N.S.P. No. 124241).

Chloropsis aurifrons aurifrons (Temminck)

Male, August 28, 1935 (A.N.S.P. No. 124149). Male, August 31, 1935 (A.N.S.P. No. 124150).

Chloropsis cochinchinensis cochinchinensis (Gmelin)

Male, August 23, 1935 (A.N.S.P. No. 124146). Male, August 24, 1935 (A.N.S.P. No. 124148). Female, August 23, 1935 (A.N.S.P. No. 124147).

Pycnonotus jocosus erythrotis (Bonaparte)

Male, August 27, 1935 (A.N.S.P. No. 124170). Male, August 27, 1935 (A.N.S.P. No. 124171). Female, August 27, 1935 (A.N.S.P. No. 124169).

Pycnonotus blanfordi conradi (Finsch)

Female, August 27, 1935 (A.N.S.P. No. 124164).

Garrulax leucolophus diardi (Lesson)

Male, August 27, 1935 (A.N.S.P. No. 124138).

Pellorneum ruficeps vividum La Touch

Male, August 25, 1935 (A.N.S.P. No. 124156).

Mixornis gularis sulphurea (Rippon)

Male, August 25, 1935 (A.N.S.P. No. 124158). Male, August 26, 1935 (A.N.S.P. No. 124157).

Rhipidura aureola burmanica (Hume)

Female, August 31, 1935 (A.N.S.P. No. 124278).

Hypothymis azurea styani (Hartlaub)

Male (adult), August 30, 1935 (A.N.S.P. No. 124251). Male (adult), August 31, 1935 (A.N.S.P. No. 124253). Male (juvenile), August 23, 1935 (A.N.S.P. No. 124252).

Orthotomus sutorius inexpectatus La Touche

Female (juvenile), August 23, 1935 (A.N.S.P. No. 124254).

Orthotomus atrogularis nitidus Hume

Male, August 26, 1935 (A.N.S.P. No. 124255). Female, August 26, 1935 (A.N.S.P. No. 124256).

Prinia rufescens rufescens Blyth

Male (juvenile), August 25, 1935 (A.N.S.P. No. 124257).

Gracula religiosa intermedia Hay

Female, August 31, 1935 (A.N.S.P. No. 124206).

Aethopyga siparaja cara Hume

Male (adult), August 23, 1935 (A.N.S.P. No. 124282).

Arachnothera longirostra longirostra (Latham)

Male, August 23, 1935 (A.N.S.P. No. 124281). Male, August 25, 1935 (A.N.S.P. No. 124279).

Arachnothera magna magna (Hodgson)

Male, August 25, 1935 (A.N.S.P. No. 124297).

MAE LAM PHAN

Hieraaetus kienerii formosus Stresemann

Female (adult), September 15, 1935 (A.N.S.P. No. 124099).

The flattened wing of this specimen measures 394 mm. and thus exceeds by 12 mm. the maximum wing length recorded for *formosus* in the original description. Since *formosus* seems to occur throughout Siam, and we have as yet no good reason to assume that *kienerii* occurs there even in winter, it would be best to consider the Mae Lam Phan bird a slightly larger example of the southern race.

Microhierax caerulescens burmanicus Kirke Swann

Male, September 10, 1935 (A.N.S.P. No. 124096). Male, September 11, 1935 (A.N.S.P. No. 124097).

Neohierax insignis cinereiceps (Stuart Baker)

Male (adult), September 14, 1935 (A.N.S.P. No. 124098).

Lobivanellus indicus atronuchalis Jerdon

Female, September 11, 1935 (A.N.S.P. No. 124135).

Psittacula eupatria siamensis (Boden Kloss)

Male, September 9, 1935 (A.N.S.P. No. 124299). Female, September 9, 1935 (A.N.S.P. No. 124300).

Treron phoenicoptera viridifrons Blyth

Female (adult), September 17, 1935 (A.N.S.P. No. 124248).

Streptopelia chinensis tigrina (Temminck)

Female (adult), September 17, 1935 (A.N.S.P. No. 124249).

Eudynamys scolopacea chinensis Cabanis and Heine

Male (subadult), September 12, 1935 (A.N.S.P. No. 124194). Male (adult), September 13, 1935 (A.N.S.P. No. 124195).

Athene brama pulchra Hume

Male (adult), September 5, 1935 (A.N.S.P. No. 124200).

This specimen, with the flattened wing measuring 150 mm., is a long-winged example of *pulchra*, as was to be expected, since *pulchra* was already known to occur as far north as Rahaeng (*cf.* Deignan, Auk, 58: 396, 1941).

Hemiprocne longipennis coronata (Tickell)

Female (in postjuvenal molt), September 7, 1935 (A.N.S.P. No. 124180). Female (adult), September 8, 1935 (A.N.S.P. No. 124179). Female (adult), September 8, 1935 (A.N.S.P. No. 124181).

Alcedo atthis bengalensis Gmelin

Male, September 5, 1935 (A.N.S.P. No. 124225).

Coracias benghalensis affinis McClelland

Male, September 4, 1935 (A.N.S.P. No. 124198).

Upupa epops longirostris Jerdon

Male, September 7, 1935 (A.N.S.P. No. 124203). Female, September 8, 1935 (A.N.S.P. No. 124205). Female, September 10, 1935 (A.N.S.P. No. 124204).

Anthracoceros coronatus leucogaster (Blyth)

Female (immature), September 4, 1935 (A.N.S.P. No. 124212).

Cyanops lineata hodgsoni (Bonaparte)

Male, September 15, 1935 (A.N.S.P. No. 124222). Female, September 7, 1935 (A.N.S.P. No. 124221).

Xantholaema haemacephala indica (Latham)

Male, September 12, 1935 (A.N.S.P. No. 124215).

Picus erythropygius nigrigenis (Hume)

Female, September 11, 1935 (A.N.S.P. No. 124233). Female, September 13, 1935 (A.N.S.P. No. 124231). Female, September 14, 1935 (A.N.S.P. No. 124232).

Micropternus brachyurus phaioceps Blyth

Male, September 7, 1935 (A.N.S.P. No. 124250).

A series (including the type) of "*Micropternus brachyurus williamsoni*" Boden Kloss from southwestern Siam cannot be separated by any character from a series of *phaioceps* from Burma and northern Siam.

Dryobates macei longipennis (Hesse)

Male, September 17, 1935 (A.N.S.P. No. 124235).

Dryobates canicapillus canicapillus (Blyth)

Male, September 5, 1935 (A.N.S.P. No. 124236). Male, September 6, 1935 (A.N.S.P. No. 124237). Male, September 15, 1935 (A.N.S.P. No. 124238). Female, September 13, 1935 (A.N.S.P. No. 124239).

Dinopium javanense intermedium (Blyth)

Male, September 17, 1935 (A.N.S.P. No. 124228).

Mirafra assamica subsessor Deignan

Male, September 7, 1935 (A.N.S.P. No. 124260). Male, September 10, 1935 (A.N.S.P. No. 124259).

These fresh-plumaged specimens agree perfectly with topotypes of *subsessor* taken in September, October, and November.

Pericrocotus peregrinus vividus Stuart Baker

Male (adult), September 4, 1935 (A.N.S.P. No. 124272).

Tephrodornis pondiceriana thai Boden Kloss and Chasen

Female, September 4, 1935 (A.N.S.P. No. 124275).

Coracina novaehollandiae siamensis (Stuart Baker)

Male, September 10, 1935 (A.N.S.P. No. 124309). Female, September 9, 1935 (A.N.S.P. No. 124308).

Dicrurus leucophaeus bondi De Schauensee

Female, September 15, 1935 (A.N.S.P. No. 124302).

Crypsirina vagabunda sakeratensis (Gyldenstolpe)

Male, September 9, 1935 (A.N.S.P. No. 124142). Male, September 16, 1935 (A.N.S.P. No. 124140). Female, September 8, 1935 (A.N.S.P. No. 124141).

Sitta europaea neglecta Walden

Female, September 16, 1935 (A.N.S.P. No. 124145).

Sitta frontalis corallina Hodgson

Male, September 6, 1935 (A.N.S.P. No. 124143). Female, September 15, 1935 (A.N.S.P. No. 124144).

Aegithina tiphia horizoptera Oberholser

Male, September 14, 1935 (A.N.S.P. No. 124154). Male, September 15, 1935 (A.N.S.P. No. 124155).

De Schauensee and Ripley have shown (Proc. Acad. Nat. Sci. Phila., 91: 346-347, 1939) that this name must be used rather than *micromelaena* (*cf.* Deignan, U. S. Nat. Mus. Bull., 186: 323, 1945).

Chloropsis aurifrons aurifrons (Temminck)

Male (adult), September 4, 1935 (A.N.S.P. No. 124151).

Pycnonotus cafer klossi (Gyldenstolpe)

Male, September 14, 1935 (A.N.S.P. No. 124165). Female, September 14, 1935 (A.N.S.P. No. 124166).

Pycnonotus blanfordi conradi (Finsch)

Male, September 11, 1935 (A.N.S.P. No. 124162). Male, September 11, 1935 (A.N.S.P. No. 124163).

Garrulax leucolophus diardi (Lesson)

Male, September 17, 1935 (A.N.S.P. No. 124139).

Kittacincla malabarica interposita Robinson and Boden Kloss

Male, September 12, 1935 (A.N.S.P. No. 124182).

Rhipidura aureola burmanica (Hume)

Male, September 6, 1935 (A.N.S.P. No. 124277).

Phylloscopus coronatus coronatus (Temminck and Schlegel)

Male, September 5, 1935 (A.N.S.P. No. 124263). Female, September —, 1935 (A.N.S.P. No. 124264).

Motacilla cinerea melanope Pallas

Female, September 13, 1935 (A.N.S.P. No. 124178).

Dendronanthus indicus (Gmelin)

Male, September 6, 1935 (A.N.S.P. No. 124177). Female, September 16, 1935 (A.N.S.P. No. 124176).

Lanius collurioides collurioides Lesson

Female, September 16, 1935 (A.N.S.P. No. 124273).

Nectarinia asiatica intermedia (Hume)

Male (nonbreeding plumage), September 17, 1935 (A.N.S.P. No. 124285).

Nectarinia jugularis flammaxillaris Blyth

Male, September 13, 1935 (A.N.S.P. No. 124287). Male, September 17, 1935 (A.N.S.P. No. 124286). Female, September 5, 1935 (A.N.S.P. No.

124289). Female, September 12, 1935 (A.N.S.P. No. 124288).

Dicaeum cruentatum siamense Boden Kloss

Male (adult), September 12, 1935 (A.N.S.P. No. 124292).

Dicaeum concolor olivaceum Walden

Male (juvenile), September 16, 1935 (A.N.S.P. No. 124291).

Dicaeum chrysorrheum chrysochlore Blyth

Male, September 9, 1935 (A.N.S.P. No. 124283).

Ploceus philippinus burmanicus Ticehurst

Female, September 10, 1935 (A.N.S.P. No. 124276).

NOTULAE NATURAE

NUMBER 175 OF MAY 10, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE GENUS MONOCLONA MIK (DIPTERA: MYCETOPHILIDAE)

BY ELIZABETH G. FISHER

Research Associate, The Academy of Natural Sciences of Philadelphia

The genera *Monoclona* Mik and *Acnemia* Winnertz were placed by F. W. Edwards[1] in the tribe *Sciophilini* and separated from the rest of the tribe by the unbranched cubitus and the bare anepisternites. *Monoclona* usually has the short vein R_4 present. The macrotrichia of the wing membrane are reflexed (pointing towards the base of the wing). In *Acnemia* R_4 is absent and the macrotrichia are decumbent (pointing towards the apex of the wing).

The Academy wishes to express its obligation to Dr. A. L. Melander for his kindness in presenting to our collections the types of the two new species here described.

Key to Nearctic species of Monoclona

(Garrett's species *M. simplex* is not included.)

1. Base of M_2 absent; male terminalium as in figure 5..........*floridensis* new species
   Base of M_2 present.. 2
2. The distance from the apex of vein Sc_1 to the apex of vein R_1 is twice the distance from the apex of vain R_1 to apex of vein R_5..................................3
   The distance from the apex of vein Sc_1 to the apex of vein R_1 is two and one half times the distance from the apex of vein R_1 to the apex of vein R_5; male terminalium as in figure 1. ....*furcata* Joh.
3. Style of male terminalium forked distally as in figure 3. ....*elegantula* Joh.
   Style of male terminalium tapers distally to a single point as in figure 4. *idahoensis* new species

Monoclona idahoensis new species Figure 4.

This species differs from other species known to me as indicated in the key above. It apparently differs from Garrett's *M. simplex* in the length of vein Sc and in the structure of the male terminalium.

---

[1] Trans. Ent. Soc. London, 1924, pp. 556, 564, 565, 1925.

Male; length 4 mm. Head dark brown, palpi, scape of antenna and basal joint of flagellum yellow, face and remaining flagellar joints fuscous. Thorax yellow, mesonotum with three fuscous stripes; anepisternites infuscated. Pleurotergites and postnotum setose. Hairs yellow. Wings yellowish hyaline, both macro- and microtrichia present. Veins yellow, setose. Cell R_1 almost square. (Vein R_4 represented by a spur in one wing of a paratype.) C extends beyond the tip of R_s, not reaching the wing apex; Sc long, ending beyond the level of vein R_4, M_2 complete. The distance from Sc_1 to R_1 is twice the distance from R_1 to R_s. Stem of halteres yellow; knob black. Legs yellow; tarsi brownish; setae black. Abdomen dark brown, apices of segments narrowly yellow. Male terminalium dark brown except the ninth tergite which is yellow. The caudal border of the ninth tergite has a row of alternating strong and weaker setae.

Holotype.—♂, Moscow Mt., Latch Co., Idaho, July 7 (A. L. Melander), A.N.S.P. No. 6671.

Paratype.—1 ♀; Chatcolet, Benewah Co., Idaho, August (A. L. Melander), A.L.M. Collection.

Monoclona floridensis new species Figure 5.

This species lacks vein R_4 in both wings; the macrotrichia are reflexed. The male terminalium are of the typical Monoclona form.

It differs from other Nearctic species in lacking the base of M_2, in having two rather than three ocelli, and in the entirely yellow thorax as well as in terminalial structure.

Male. Total length 3 mm. Head dark brown, black around the two ocelli which are closely approximated and widely remote from the eye margins. Scape, basal joint of the flagellum and the palpi yellow. Setae brown. Thorax entirely yellow. Pleurotergites and postnotum setose. Mesonotum without stripes, uniformly setose. the setae yellow. Wings hyaline, both macro- and microtrichia present; the macrotrichia evenly distributed over the entire wing membrane. C extends ¼ the distance from R_s to M_1 but does not reach the wing tip; Sc long, ending about the length of r-m beyond the level of R_s; Sc_2 well proximad of the origin of R_s; R_4 absent in both wings; M_2 incomplete at its base for a distance almost equal to the length of r-m but still traceable; Cu unbranched. Halteres black. Legs yellow; spurs 1-2-2. Abdominal segments one to three black with narrow posterior margins; the fourth and beyond yellow. Male terminalium as in Figure 5. Ninth tergal border with a strong seta at each angle.

Holotype.—♂; Orlando, Orange Co., Florida, April 26, 1930 (A. L. Melander Collector), A.N.S.P. type No. 6672.

Monoclona furcata Johannsen Figure 1.

Monoclona furcata Johannsen, Maine Agr. Exp. Sta. Bull., no. 180, p. 187, 1910. Sherman, Proc. Ent. Soc. Brit. Col., 1919, p. 11. Johnson, Occas. Papers Boston Soc Nat. Hist., VII, p. 78, 1925.

MAINE: Orono, Penobscot Co., May 26, (O. A. Johannsen) [Johannsen, 1910; Johnson, 1925],[2] 1 ♂, *Type*, O.A.J.

*BRITISH COLUMBIA: [3] [Sherman, 1919].

Monoclona simplex Garrett

Monoclonna [sic!] *simplex*, Garrett, Sixty-one New Diptera, Cranbrook, B. C. p. 9, 1925.

*BRITISH COLUMBIA: Caulfields, May, (C. B. D. Garrett), [C. B. D. Garrett, 1925] 1 ♂, *type*, 5 ♂ paratypes, C.B.D.G.

I do not know this species.

Monoclona elegantula Johannsen Figures 2 and 3.

Monoclona elegantula Johannsen, Maine Agr. Exp. Sta. Bull., no. 180, pp. 128, 129, figs. 84, 107, 1910.—Johnson, Occas. Papers Boston Soc. Nat. Hist., VII, p. 78, 1925. Brimley, The Insects of North Carolina, N. C. Dept. Agr., Div. Ent., Raleigh, N. C., p. 326, 1938.—Sherman, Proc. Ent. Soc. Brit Col., 1919, p. 11.

NOVA SCOTIA: Cape Breton Island, Sept. (E. G. Fisher) A.N.S.P.

QUEBEC: Ste Anne de la Perade, Champlain Co., Aug. 6, (A. L. Melander), 1 ♂, A.L.M.

*MAINE: Mt. Desert, Hancock Co., Aug. 10 [Johnson, 1925].

MASSACHUSETTS: Petersham, Worchester Co., July (A. L. Melander), 1 ♂, A.L.M.

NEW YORK: Ithaca, Thompkins Co., August, [Johannsen, 1910; Leonard, 1926], *type* ♂, *allotype* ♀, paratypes, O.A.J. Fish Creek, Franklin Co., August 2 (A. L. Melander) 1 ♂, A.L.M. Bear Mt., Rockland Co., Sept 19, (A. L. Melander), 1 ♀, A.L.M. Erie Co., June-Sept. (M. C. Van Duzee), [Leonard, 1926].

PENNSYLVANIA: Dubois, Clearfield Co., Sept 3 (A. L. Melander), 2 ♂, 2 ♀, A.L.M. and A.N.S.P.

NORTH CAROLINA: Hendersonville, Henderson Co., June [Brimley, 1938], 1 ♂, N. C. Dept. Agr.

*BRITISH COLUMBIA: [Sherman, 1919].

In addition to the above species Sherman, 1919 records "*Monoclona* new species" from British Columbia.

---

[2] In the distribution records, the collector's name, when known, is placed in parenthesis, the authority of a published record and the date of publication in square brackets.

[3] An asterisk indicates that I have not seen the specimen on which the record is based. The location of the specimen in various collections is indicated by initials.

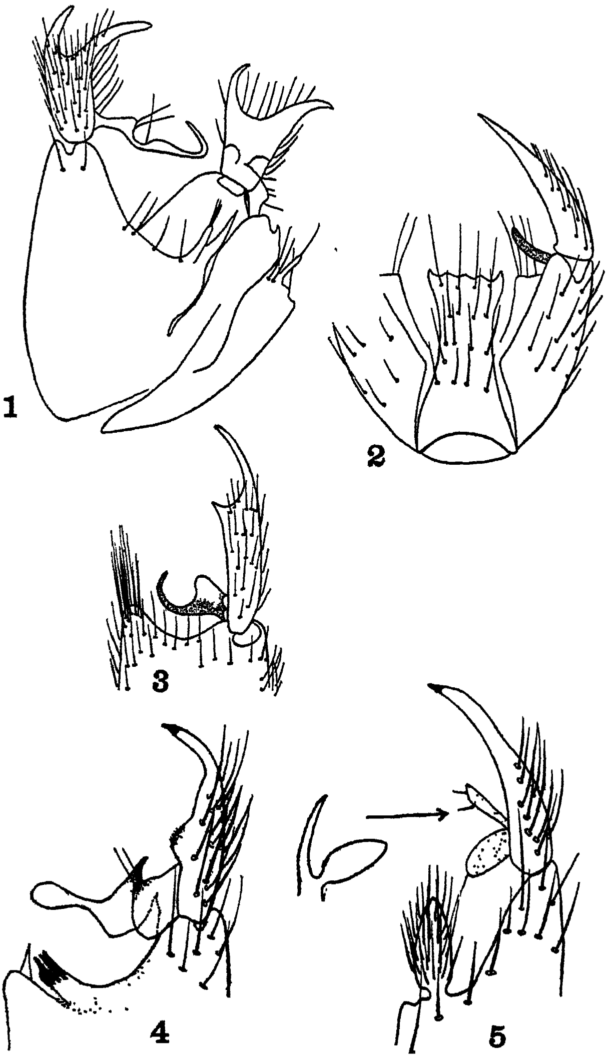


Fig. 1. *Monoclona furcata* Johannsen. Dorso-lateral aspect of male terminalium drawn from type slide. Fig. 2. *Monoclona elegantula* Johannsen. Dorsal aspect of male terminalium, type. Fig. 3. *Monoclona elegantula* Johannsen. Lateral aspect of male terminalium, dorsum to the right, type. Fig. 4. *Monoclona idahoensis* new species. Lateral aspect of male terminalium, dorsum to the right, type. Fig. 5. *Monoclona floridensis* new species. Lateral aspect of male terminalium, dorsum to the right, type.

NOTULAE NATURAE

Number 176 of May 15, 1946

The Academy of Natural Sciences of Philadelphia

THE BIRDS OF MONA ISLAND

by James Bond

Associate Curator of Birds, The Academy of Natural Sciences of Philadelphia

Mona Island is situated in Mona Passage about midway between southwestern Puerto Rico and Saona Island (Dominican Republic). It is approximately six and one half miles in length, with a maximum width of four miles, and is described as being of limestone formation. There is a narrow coastal plain at the western end, but the rest of the island is encircled by a precipitous sea-cliff, ranging from 125 to nearly 200 feet in height. Three roadways lead up from the coastal plain to the interior plateau, which is flat, except for a depression near the centre known as " Los Ceresos ". The island is lightly wooded, and at the northeastern end is an extensive and impenetrable cactus thicket.

Off the northwest coast of Mona lies the oval-shaped, rocky islet of Monito, some 25 acres in area. This small island is notable for the sea bird colonies that flourish there.

Although specimens of the endemic Mona paroquet (*Aratinga chloroptera maugaei*) reached European museums prior to the visit of Mr. Wilmot W. Brown in 1892, this gentleman was the first to make a comprehensive collection of birds on this island, where he worked during February and part of March of that year. There followed Mr. Beecher S. Bowdish, who studied birds on Mona from August 5 to 21, 1901, Mr. Parker H. Struthers, who remained on the island from July 14 to 18, 1921, and for many days between June 23 and July 18, 1926, and Dr. Stuart T. Danforth, who collected there from April 14 to 16, 1935. Dr. Karl P. Schmidt, who landed on Mona in 1919, devoted his attention primarily to reptiles and amphibians, but includes in his account of the herpetology of the island a list of 22 species of birds. This is the outstanding work on the geology, general biology and zoögeography of Mona.

During the past ten years Mona has been visited by Sr. Ventura Barnés of Puerto Rico, and by Mr. Harry A. Beatty of St. Croix. Mr. Beatty remained on the island for about three weeks in August, 1944, and collected birds for this Academy from August 12 to 27. I understand that Sr. Barnés, who is supervisor of the Fisheries Project on Mona, has also obtained a representative collection of the birds of the island.

It may now be said that no island comparable in size in the Antilles has as few species of land birds as Mona. There are only three permanent resident passerine birds; and the absence of *Tiaris bicolor, Coereba flaveola* and *Dendroica petechia* is truly astonishing. Possibly the avifauna has been decimated by hurricanes, and the island may be too remote to be restocked readily from Hispaniola or Puerto Rico. Nevertheless, four species (*Falco sparverius dominicensis, Zenaida a. asiatica, Zenaida m. macroura* and *Crotophaga ani*) have evidently reached Mona within the past 20 years, at least three of these from Hispaniola. The arrival of these birds on Mona may have resulted from the hurricane that struck the southern coast of the Dominican Republic on September 3, 1930, one of the worst storms ever recorded in the Caribbean.

One of the purposes of this paper is to call attention to the poverty of the bird-life of Mona, with the suggestion that this be reinvestigated after an interval of at least 25 years. In the meantime all bird collecting should be forbidden on this island, where several species have obtained at best a mere toehold.

ANNOTATED LIST*

Phaëthon lepturus catesbyi Brandt

Brown found this tropic-bird "abundant and breeding" on Mona in February. Bowdish reported the species from the island but did not indicate in what numbers. Struthers states that "several hundred" were nesting on the limestone cliffs on the western and northern coasts in the early summer of 1926, when fresh eggs in addition to "fully plumed" young were observed. Beatty writes that in August, 1944, only about 15 were present, remarking that these were evidently nesting. This was the only sea bird that he found on Mona during his visit.

---

* An asterisk denotes a North American migrant, a dagger a summer resident.

I have stated my reasons for use of *catesbyi* Brandt, instead of *americanus* Ogilvie-Grant, as the subspecific name of this tropic-bird (Auk, vol. 62, 1945, p. 660). I might add that the young of both *P. lepturus* and *P. aethereus* have the upper parts barred with black.

Pelecanus occidentalis occidentalis Linnaeus

Danforth observed a pair off Mona on July 16, 1921, and Beatty states that two appeared daily off the coast. Struthers noted adults with young unable to fly at the lagoon near the beach at Sardinera in 1926, and found four nests. He states that the lagoon had been formed within a period of ten years and was an ideal habitat for pelicans, which formerly did not breed on Mona.

Sula leucogaster leucogaster (Boddaert)

A common bird about Mona, where it was found nesting in abundance in February (Brown). Struthers and Beatty also report this species, although the latter found it only on Monito Island, where were congregated some 300 adults and a few immature individuals during the month of August.

Sula sula sula (Linnaeus)

The red-footed booby was first recorded from the vicinity of Mona by Danforth, who noted two individuals a short distance off the coast on July 17, 1933. Beatty found on Monito Island approximately 500, of which about half were immature.

Fregata magnificens rothschildi Mathews

Bowdish reported the frigate bird as common and breeding on Mona. Struthers noted about 30 during his visit in 1921, and found the species common in 1936. Beatty discovered a colony on Monito Island in August, 1944. There were 20 nests, every one of which contained a single white headed nestling. He states that the young, though fully feathered, were quite helpless.

Nyctanassa violacea violacea (Linnaeus)

Bowdish recorded this heron as common on Mona. Struthers states that it was " quite common " in the coconut grove near the beach at Sardinera, and was frequently heard at night. Beatty observed the bird on but six occasions. He found one nestling.

***Pandion haliaetus carolinensis** (Gmelin)

Bowdish examined the foot of an osprey that had been killed on Mona. The record presumably pertains to *carolinensis* rather than to *ridgwayi* Maynard.

***Falco peregrinus anatum** Bonaparte

Observed on Mona Island from April 14 to 16 (Danforth). April 18 is the latest spring date that I have for the duck hawk in the West Indies.

Falco sparverius dominicensis Gmelin

This falcon was first recorded from Mona by Danforth in 1935. He collected three specimens—two males and one female. Beatty observed it on the plains and at the eastern end of the island, and obtained one male and three females. He states that, " a count of 16 " was made on Mona.

Danforth has remarked that individuals from Mona average somewhat larger than those from Hispaniola. Measurements (in millimeters) of the specimens taken by him and by Beatty are as follows:

♂ (3): wing 184.9-187.8 (186.2); tail 115.2-122.6 (118.6); tarsus 36.9-40 (39).

♀ (4): wing 184-190.6 (187.5); tail 115-121.5 (119); tarsus 36-40.2 (38.6).

Wetmore and Swales (Bull. U. S. Nat. Mus., 155, 1931, p. 122) give wing-measurements of males from Hispaniola as 182-193 (186), of females 184.5-202 (190.3). It would thus appear that the Mona birds do not average larger than those from Hispaniola. Indeed, there can be little doubt that the sparrow hawk reached Mona from the Dominican Republic during the past 20 years.

***Arenaria interpres morinella** (Linnaeus)

A flock of twelve turnstones was noted by Danforth on Mona.

***Actitis macularia** (Linnaeus)

Collected on Mona by Brown and Bowdish.

***Ereunetes pusillus** (Linnaeus)

Taken on Mona by Bowdish.

***Erolia minutilla** (Vieillot)

Two reported seen on Mona by Struthers.

†Himantopus himantopus mexicanus Müller

Struthers found the black-necked stilt common about the lagoon, near West Point, during his second visit to Mona, but the birds were not nesting at that time.

†Larus atricilla Linnaeus

Reported from Mona by Bowdish and Struthers, but not found by Beatty.

†Sterna anaethetus melanoptera Swainson

Reported by Bowdish as " common " on Mona Island, but not found there by any other ornithologist. This species breeds on Desecheo Island.

†Sterna fuscata fuscata Linnaeus

Both Bowdish and Struthers found the sooty tern " common " on Mona. Beatty saw the species only " out to sea ". He writes me that this and the preceding species sometimes breed on the same islet in the Virgin Islands (e. g., Little Saba Cay, Dove Cay), but that the colonies are separate, the nesting site of the sooty tern being the more exposed.

†Anoüs stolidus stolidus (Linnaeus)

Bowdish remarks that the noddy was " by far the most abundant species on Mona " during his visit. Struthers did not record it during his first trip to the island, but in 1926 found it very common, especially in the vicinity of West Point, where several hundred were nesting. Beatty found this bird on Monito, where eight adult individuals were noted in a large cavern.

Columba leucocephala Linnaeus

Brown and Bowdish collected this pigeon on Mona, the latter remarking that it was "very abundant ". Struthers, on his second visit to the island, states that it was nesting on the plateau by the thousands. He noted " at sunrise and sunset flocks numbering as high as 500 individuals " approaching the island from the direction of Hispaniola. Several specimens that were collected had the seed of the royal palm in their crops. This palm is not found on Mona.

Struthers remarks that the natives say these pigeons all leave in October, but the fact that Brown obtained the species in winter suggests that a few remain on the island throughout the year, just as they do in the Bahama Islands. Beatty estimated that there were approximately 30 individuals on Mona in late August. These were for the most part flushed from drupe-bearing trees.

Columba squamosa Bonnaterre

Records of this species from Mona are unsatisfactory, since no specimens have been taken on this island. Bowdish reported it as " abundant ", but less so than *leucocephala*. Struthers, on his first visit to Mona in July, 1921, remarked that it was " very common ", although he did not mention having seen the White-crowned Pigeon at that time. There are no subsequent records.

Zenaida macroura macroura (Linnaeus)

The Mourning Dove was seen on one occasion by Beatty; when an adult and immature bird came to a " watering sink ". The status of the species, not previously recorded from Mona, must be considered questionable.

Zenaida aurita zenaida (Bonaparte)

An abundant species on Mona, according to those who have visited the island.

Zenaida asiatica asiatica (Linnaeus)

This conspicuous dove was first discovered on Mona by Barnés in 1944, and is evidently a recent arrival from the Dominican Republic. Incidentally, it is worth noting that both this species and the Mourning Dove (*Z. m. macroura*) have been reported from Puerto Rico in recent years.

Beatty estimated that there were 40 white-winged doves on Mona, of which about half were immature, many just out of the nest. Mr. Boardman Conover, of the Chicago Natural History Museum, writes me that he has received a specimen from Beatty. Barnés first noted the species on May 4. It is perhaps merely a summer resident on the island.

Columbigallina passerina exigua Riley

Beatty has sent two males and two females of this dove, which is one of the few common birds of Mona. The race (*exigua*) is endemic to this island.

Ground doves of the southern Bahama Islands have been considered identical with those from Mona, but are nearer to *bahamensis*. I recently (1945) described the bird that inhabits the Inagua, Caicos and Turk Islands as a new subspecies (*C. p. volitans*).

Oreopeleia montana montana (Linnaeus)

Bowdish recorded this quail-dove as " very common " on Mona in 1901, but this statement is open to question. The species is definitely known from this island, since Struthers obtained a specimen on the coastal plain in 1926. He states that the natives were familiar with the bird and declared that it sometimes nested on Mona. Beatty writes me that he neither saw nor heard a quail-dove during his visit.

This species is locally common in Cuba, Jamaica, and in the Dominican Republic, but rare in Haiti and on the Isle of Pines and has become scarce of late in Puerto Rico, according to Danforth (Los Pajaros de Puerto Rico, 1936, p. 98). Elsewhere in the Greater Antilles, it is known only from Gonave, Mona and Vieques islands, there being but one definite record from each.

Oreopeleia chrysia (Bonaparte)

Reported as seen on Mona by Bowdish. Conditions on this island would seem more suitable to this species than to *O. montana*.

Aratinga chloroptera maugei (Souancé)

This paroquet was evidently derived from Hispaniola, where a closely allied race (*C. chloroptera*) is found. The Mona form is now extinct, owing in all probability to its decimation by pigeon hunters, who visited this island in the last century. Brown, in 1892, obtained a female that might well have been the last of its race.

On one occasion, when collecting specimens of *chloroptera* in Haiti, I noticed that the birds seemed oblivious to the sound of a shot. Had I wished, I might have been able to kill every bird in the flock! Clearly the few paroquets that existed on Mona had little chance of survival.

Brown's specimen of *maugei* differs from a series of *chloroptera* in being slightly smaller and duller green below, but "the greatest peculiarity is found in the extensive red on the under primary coverts, this color pervading all of these coverts except two on one side" (Wetmore and Swales, U. S. Nat. Mus. Bull. 155, 1931, p. 217).

The type of *maugei* is apparently preserved in the Paris Museum and there is another specimen in Leyden. Both these skins are believed to have come from Mona, although the species is said to have occurred formerly in Puerto Rico. Insofar as I am aware, these are the only birds that were collected on Mona prior to Brown's visit in 1892.

Coccyzus minor nesiotes Cabanis and Heine

Although Cory does not list a specimen of this cuckoo from Mona in the collection of the Chicago Natural History Museum (Cat. Birds of the Americas, vol. 2, pt. 2, 1919, p. 336), he records it from the island in his "Catalogue of West Indian Birds" (1892, p. 102), presumably on the basis of a skin or skins taken by Brown. Bowdish noted the species as fairly common, and Struthers, on his second visit to Mona, reported several seen. Beatty found about eight individuals, of which he collected two males and two females. The specimens are in rather worn plumage. They average paler below than most examples of *nesiotes* examined from elsewhere, but are decidedly more ochraceous on the under parts than *maynardi*.

†**Coccyzus americanus americanus** (Linnaeus)

Bowdish obtained a yellow-billed cuckoo on Mona Island on August 17, 1901. The species is a summer resident in the Greater Antilles and Bahama Islands. I have recently examined sets of eggs of this cuckoo taken in Oriente Province, Cuba, by Dr. Charles Ramsden.

Crotophaga ani Linnaeus

The ani has evidently become established on Mona within the past 20 years. It was recorded by Danforth near Uvero on April 16, 1935, and was said at that time to be found in the vicinity of Sardinera. Beatty states that there were two flocks on Mona in 1914, including some 20 individuals, several of which " were just out of the nest." He obtained an adult male and two females.

***Ceryle alcyon alcyon** (Linnaeus)

Cory records the belted kingfisher from Mona, presumably on the basis of a specimen taken by Brown (Cat. West Indian Birds, 1892, p. 103), and Struthers noted the bird on July 16, 1921, which constitutes my earliest summer record for the species from the entire West Indian region.

Tyrannus dominicensis dominicensis (Gmelin)

Brown, Bowdish, Struthers and Beatty obtained the gray kingbird on Mona. According to Struthers (1927), it does not appear to be common. Bowdish notes that this species feeds on berries and seeds in addition to insects.

Struthers states that ten individuals of the Puerto Rican *Tolmarchus* (=*T. caudifasciatus taylori*) were seen on Mona in 1921, but the record doubtless pertains to *Tyrannus dominicensis*.

†Progne subis dominicensis (Gmelin)

Recorded from Mona by Bowdish, Struthers and Beatty. A young female was taken by Struthers on June 30, 1926.

Petrochelidon sp?

A single *Petrochelidon* was observed by Beatty associating with a few pairs of *Progne*. This may have been *P. fulva*, the Antillean species, or a transient individual of the North American *P. pyrrhonota*.

Margarops fuscatus fuscatus (Vieillot)

This thrasher is by far the commonest land bird on Mona, and it appears to be even more abundant on the little island of Desecheo, where it is the only resident land bird. Beatty, who collected a male and two females, estimated that 1000 individuals inhabit Mona, while Wetmore states that there were perhaps 1200 on Desecheo in 1912.

The Pearly-eyed Thrasher has a very odd distribution, and seems to thrive best on small islands. It is very local in Puerto Rico and there is no definite record of the species from Hispaniola, although it reappears on Beata Island, off the south coast of the Dominican Republic, and in the southern Bahama Islands.

***Mniotilta varia** (Linnaeus)

One obtained by Brown.

***Dendroica discolor discolor** (Vieillot)

One obtained by Brown.

***Seiurus noveboracensis notabilis** Ridgway

One taken by Brown (cf. Hellmayr, Birds of the Americas, pt. 8, p. 419).

***Seiurus motacilla** (Vieillot)

Bowdish collected a specimen of this water-thrush on August 18, 1901. The individual was presumably a transient, as the species requires fresh-water streams both in its summer and winter home. However, a few individuals of *S. noveboracensis* probably winter on Mona. I have often found the latter feeding along the scrub-bordered shore of many islands of the West Indies.

***Piranga olivacea** (Gmelin)

An adult male in full breeding plumage was collected on Mona (May 3, 1944) by Barnés. The scarlet tanager has not yet been reported from either Hispaniola or Puerto Rico.

Agelaius xanthornus monensis Barnés

This species is known only from Puerto Rico and Mona, birds from the latter island constituting a distinct geographic race, which has but recently been described (Auk, vol. 62, p. 299, 1945).

The Mona form differs from that found on Puerto Rico in having a paler yellow shoulder patch, a character readily apparent in fresh skins.

All ornithologists who have visited Mona have found this blackbird. Struthers reported it as "quite common" in 1926, for it was seen "almost daily on trips to the plateau or along the coastal plain". Beatty, however, located this bird only about the cactus thicket at the northeastern end of the island, where he obtained four specimens.

BIBLIOGRAPHY

Barnés, Ventura, Jr. 1945. A new form of *Agelaius* from Mona Island, Puerto Rico. Auk, vol. 62, pp. 299-300.

——— 1946. New Records for the Puerto Rican avifauna. Auk, vol. 63, pp. 99-100.

Bond, James, 1945. Additional notes on West Indian Birds. Not. Nat. Acad. Nat. Sci. Phila., no 148, pp. 1-4.

Bowdish, B. S. 1902-1903. Birds of Puerto Rico. Auk, vol. 19, pp. 356-366; vol. 20, pp. 10-23.

Cory, Charles B. 1892. Catalogue of West Indian Birds.

——— 1892. Remarks on a collection of birds made by Wilmot W. Brown, Jr., on Mona and Porto Rico during February and part of March, 1892. Auk, vol. 9, pp. 228-229.

Danforth, Stuart T. 1936. New records for Mona Island, West Indies. Auk, vol. 53, pp. 100-101.

Schmidt, K. P. 1926. The Amphibians and Reptiles of Mona Island, West Indies. Field Mus. Nat. Hist. Zool. Ser., vol. 12, no. 12, pp. 149-163.

Struthers, Parke H. 1923. Observations on the Bird Life of Porto Rico. Auk, vol. 40, pp. 469-478.

——— 1927. Notes on the Bird-Life of Mona and Desecheo Islands. Auk, vol. 44, pp. 539-544.

Wetmore, Alexander. 1916. Birds of Porto Rico. U. S. Dept. Agric. Bull. 326, pp 1-140.

——— 1927. The Birds of Porto Rico and the Virgin Islands. New York Academy of Sciences, Scientific Survey of Porto Rico and the Virgin Islands, vol. 9, pts. 3 and 4, pp. 245-571.

NOTULAE NATURAE

NUMBER 177 OF MAY 24, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A GASTROPOD OF THE GENUS VELATES FROM THE FLORIDA EOCENE

BY HORACE G. RICHARDS

Associate Curator of Geology and Paleontology, Academy of Natural Sciences of Philadelphia

The genus *Velates* (Gastropoda) is widespread in Eocene deposits of Europe, Asia and Africa, but is rare in the Western Hemisphere, and has not hitherto been reported from the mainland of eastern North America.

Vokes[1] recorded *V. perversus* (Gmelin) from the Domengine and Lower Llajas formations (Middle Eocene) of California, and described *V. californicus* Vokes from the Llajas formation.

Trenchman,[2] reported *V. perversus* from Jamaica and Cooke[3] described *Neritina? grandis* Cooke from St. Bartholomew Island in the West Indies. This is probably a *Velates*, and since the name *Neritina grandis* is preoccupied (*N. grandis* Sowerby, 1840), Cooke[4] is proposing the new name *V. vokesi* Cooke.

Cooke (1919, p. 126) also mentions a cast of a species resembling a *Velates* in the Ocala limestone at the Holder Phosphate Mine, 5 miles southwest of Inverness, Florida. According to Fischer (personal communication) the beds at this locality are equivalent to those which yielded the specimens described below.

---

[1] Vokes, H. E, Univ. Calif. Pub Geology, vol. 23, pp. 381-5, 1935.

[2] Trenchman, C. T., Geol. Mag., vol 60, pp. 347-8, 1923.

[3] Cooke, C. W., Carnegie Institution Wash, Pub. 291, p. 126, 1919.

[4] Cooke, C. W., Jour. Paleont., vol. 20, in press, 1946.

The writer recently received some fifteen specimens of *Velates* found in fresh river bottom dredgings ⅛ to 1 mile below the Florida Power Corporation plant on the Withlacoochee River, Citrus County, Florida (Sect. 3 17S, 16E). The material was collected by Joseph E. Banks and Alfred G. Fischer of the Stanolind Oil and Gas Company; the release of this information was kindly given by that company.

Velates floridanus new species Text plates 1 and 2.

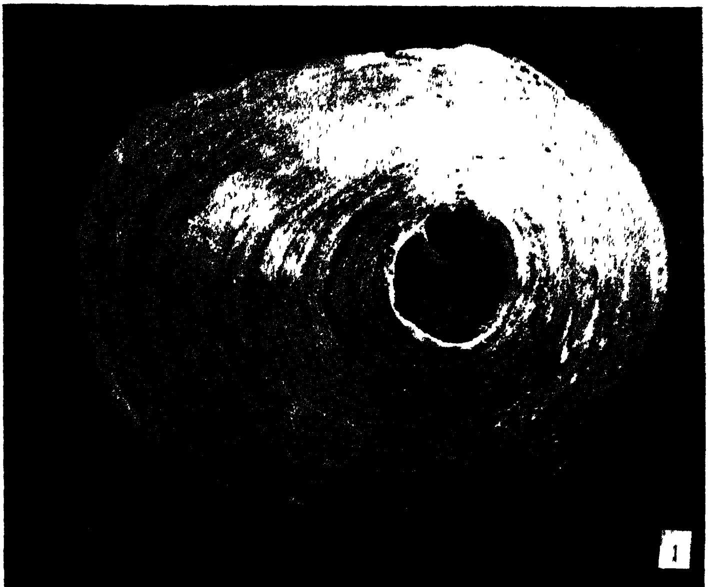
Shell large, conical, oval. Spire consists of a small knob projecting over the body whorl. Nepionic (apical) whorl distinctly marked off as if embryonic shell. Conspicuous concentric lines of growth. Body whorl high, making up practically the entire shell. There are traces of faint radial sculpture, about 8 per centimeter, on portions of the holotype, but these may be accidental since they do not show on portions of the same shell containing remnants of the epidermis, nor on the other specimens. There are, however, more widely spaced radiating striae. There was apparently a conspicuous epidermis. Aperture large but not clearly shown. The shell near the palatal lip is thick. The columellar lip does not show traces of teeth as in *V. perversus*, but possibly these have been eroded from the present material. Very thick columellar callus with low rounded cords separated by subequal sulci. These ridges are possibly homologues of the teeth in *V. perversus*. The columellar callus appears to occupy only about half of the greatest diameter of the aperture. There is a moderately large umbilical depression. The apical whorls of the holotype are broken away revealing the presence of a columella.

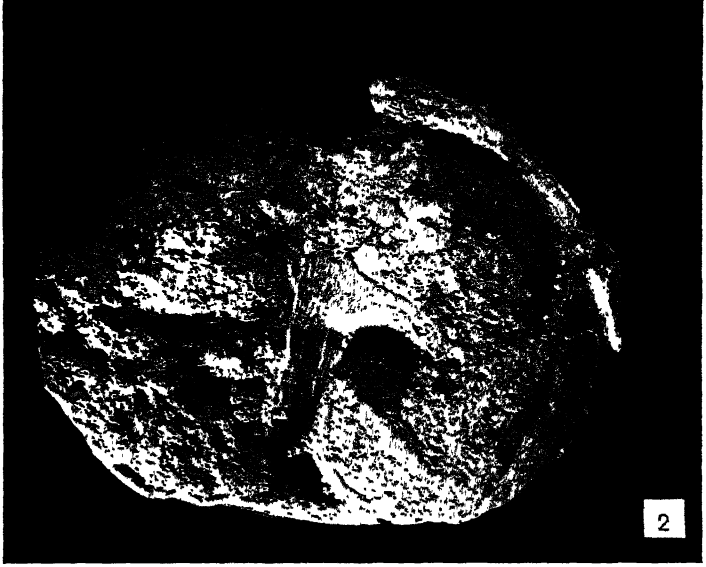
From the aperture side the spiral structure of the shell must have been evident. The penultimate whorl is clearly visible on the ventral side of the shell. Externally, the spiral arrangement is limited to the embryonic shell.

Type.—Withlacoochee River, Citrus County, Florida. A.N.S.P. no. 16827.

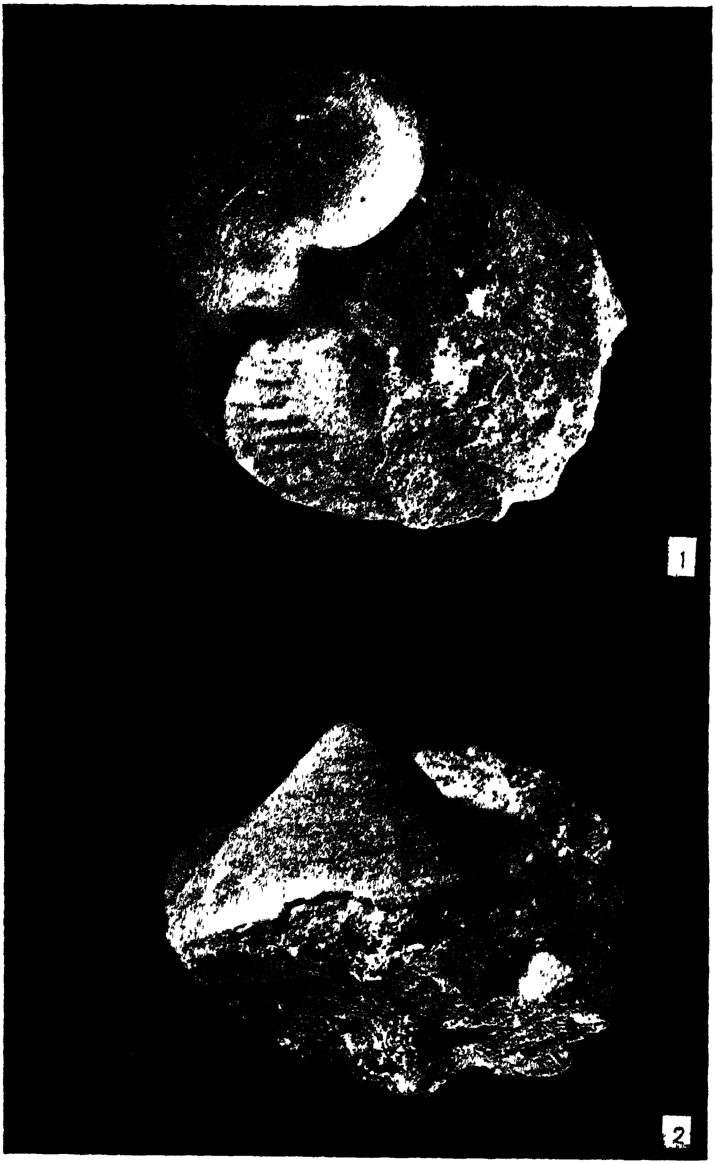
Much larger than *V. perversus*, and while approximately similar as viewed from above, it differs on the ventral side by its prominent umbilical depression, prominent callus and the conspicuous cords on the columellar callus. Also larger than *V. californicus* and with more conspicuous callus with the cords. *V. vokesi* is smaller and too poorly preserved to determine its exact position.

Because of the spiral character of the shell, it is believed that *V. floridanus* represents a primitive example of the genus.


1


2

Velates floridanus new species. Fig 1.—Upper view of holotype. Fig. 2.—Lower view of holotype. (Both × about ⅔.)



Velates floridanus new species. Fig 1.—Internal mold, paratype. (× about ⅔.) Fig. 2.—Paratype. (× about ⅘.)

Measurements (in millimeters)

	Length	*Width*	*Height*	
V. floridanus Richards (holotype)	132	105	75	A.N.S.P. 16827
V. floridanus Richards (paratype)	71	58	44	A.N.S.P. 16828
V. floridanus Richards (juv.)	55	45	31	A.N.S.P. 16830
V. vokesi Cooke (juv.)	35	32	—	
V. vokesi Cooke	80	72	—	
V. californicus Vokes (type)	55	48	—	(from figures)
V. perversus (Gmelin) (St Jobans, France)	70	61	—	A.N.S.P. 7474

The region where the fossils were found has been mapped as Ocala (= Jackson Eocene) by Cooke[5]. However recently some doubt has been cast on the exact age of this material. Applin and Applin[6] proposed the Avon Park formation for deposits in Florida wells below the Ocala, and suggested a Claiborne age for them. Ericson[7] determined that deposits of pre-Ocala age outcropped in southern Levy and northern Citrus counties, and should be correlated with the Avon Park formation of Applin. On the suggestion that subsurface names cease to be valid when surface deposits of the same age are described, Ericson proposed the name Gulf Hammock for this formation, in which he included at the top the *Velates* bearing beds.

A personal communication from Alfred G. Fischer states:

" The *Velates* bearing beds consist of mainly white limestones of medium to coarse sand texture, composed largely of miliolids and shell fragments, and thought to be about 25 feet thick. They are characterized by a fauna which includes some Avon Park and a few Ocala foraminifera, numerous Ocala echinoids, and some echinoids not known from other beds. Besides the miliolids, the most common fossils appear to be *Eodictyoconus cubensis*, *Periarchus lyelli*, *Rumphia archerensis*, and *Eupatagus mooreanus*, none of which seem to occur in the overlying beds of the Ocala limestone in the Florida peninsula, and which, with the exception of the *Eodictyoconus*, have not been reported from the Avon Park formation. The fact that *Velates* is abundant only in the lower part of the beds involved, suggests that it may be a holdover from the Avon Park, the macrofauna of which is practically unknown. In the area of outcrop the *Velates* bearing beds appear to conformably overlie the Avon Park dolomites, and grade upward through a zone of barren miliolid limestone into typical Ocala limestone.

---

[5] Cooke, C. W., Fla. Geol. Surv., Bull. 29, 1945.

[6] Applin, Paul and Esther, Bull. Amer. Assoc. Petrol. Geol., vol. 28, p. 1686, 1944.

[7] Ericson, David B., Science, vol. 102, p 234, 1945.

" It now appears probable that, contrary to the Applin's tentative correlation, the Avon Park formation is of Jackson rather than Claiborne age, and that the Ocala represents only middle and upper Jackson."

The presence of *Velates* in large numbers suggests a different faunal assemblage from that of the Ocala of Florida, or for that matter, from the Eocene of the Gulf Coast. Since *Velates* is also found in the Middle Eocene of Jamaica and the Upper Eocene (?) of St. Bartholomew, it seems that the *Velates* bearing beds of Florida have geographical affinities with the West Indian and European Eocene rather than with that of Continental North America. Whether the age be lower Jackson or Claiborne can only be determined by a study of the other elements of the fauna.

The only other specimen available from the new Florida locality at this time is an unusually fine specimen of *Eupatagus mooreanus* Pilsbry, an echinoid described from the Withlacoochee River, Florida, and referred to the Ocala formation, but which comes from the area now assigned to the Avon Park or Gulf Hammock formation.

NOTULAE NATURAE

NUMBER 178 OF JUNE 21, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

ZOOLOGICAL RESULTS OF THE GEORGE VANDERBILT AFRICAN EXPEDITION OF 1934. PART XI.—A NEW PIPUNCULUS FROM AFRICA (PIPUNCULIDAE, DIPTERA)

BY WILLIAM F. RAPP, JR.
Department of Entomology, University of Illinois

Among the insects collected by the George Vanderbilt African Expedition of 1934 there was one species of Pipunculidae. A careful study of this specimen revealed that it was an apparently undescribed species. I am greatly indebted to Mr. E. T. Cresson, Jr., Associate Curator of Insects of the Academy, for the loan of this specimen, and to Miss J. L. Cooper for making the drawings.

Pipunculus flavicrus new species

Black, the abdomen shining, except for the first segment which is opaque; legs yellow; stigma occupying one half of the subcostal cell; wings golden yellow. Length, 4 mm.

Male. Eyes touching for a short distance between frontal triangle, which is silvery, and vertical triangle, which is black; face silvery merging into black at base; mouthparts yellowish. Occiput black with a grayish pubescence. Antennae, first and second segments dark reddish brown, third segment acuminate, yellowish; arista black, the basal thickening short.

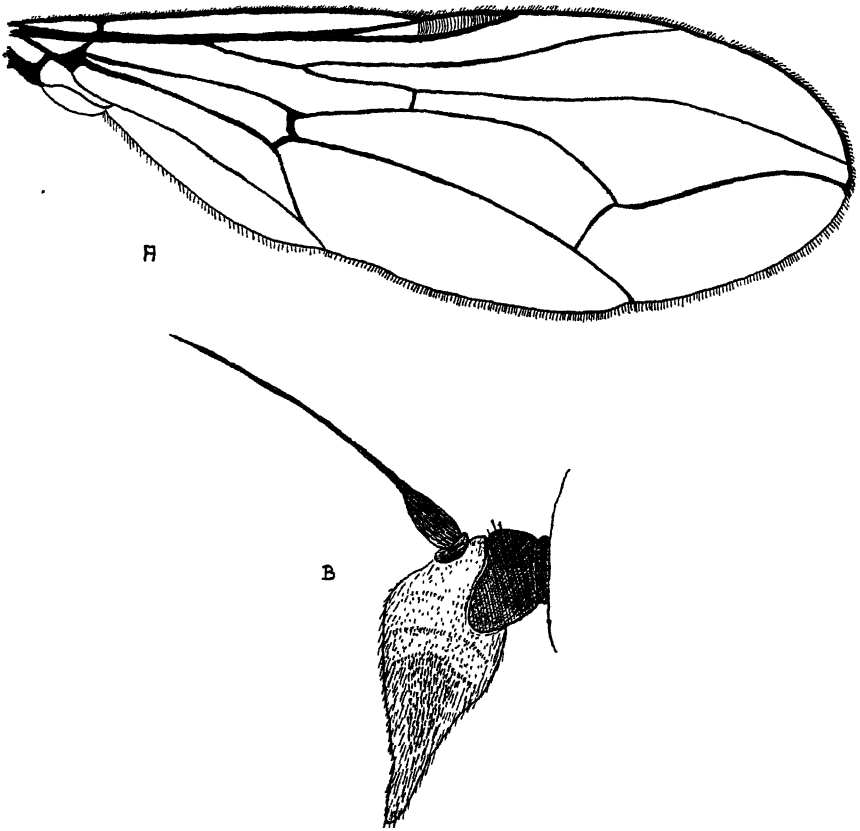
Thorax black, brown pollinose, notopleura gray on top edge; humeri brownish, mesopleura grayish.

Legs yellow, the coxae black, gray pollinose, fifth tarsal segment black. Pulvilli of medium size. Hair on legs black.

Wings golden yellow in color; stigma brown, opaque. Squamae grayish; halteres black with brown pollen.

Abdomen shining black. Genital segment cleft to the right.

Holotype.—Female, Kijabe section, Kikuyu Escarpment, 8200 ft. Kenya. (George Vanderbilt African Expedition of 1934; J. A. G. Rehn) June 24, 1934. Type, Academy of Natural Sciences of Philadelphia No. 6668.



Pipunculus flavicrus new species. A—Wing. B—Antenna.

According to Rehn,[1] the type locality is an area of "bamboo forest, beard-moss draped mountain forest and moor-like grassland of tussock grass and sedge, on top of the escarpment forming the eastern border of the Rift Valley."

The species comes closest to *bequaerti* Curran, but differs in the color of the coxae, a smaller stigma, and the color of the occiput.

(*flavus*, yellow + *crus*, leg.)

The type is unique.

---

[1] Proc. Acad. Nat. Sci. Phila., vol. 88 (1936), p 8.

NOTULAE NATURAE

NUMBER 179 OF JUNE 21, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

SPECIES OF STEMODIA AND GALVEZIA (SCROPHULARIACEAE) ON THE COAST OF ECUADOR AND NORTHERN PERU

BY FRANCIS W. PENNELL

Curator of Botany, Academy of Natural Sciences of Philadelphia

Among the plants collected by Dr. Henry K. Svenson of the Brooklyn Botanic Garden along the coast of Ecuador and northern Peru are members of *Stemodia* and *Galvezia* that have required special study. The former genus is widespread in lowland tropical America, but the latter is peculiar to arid coastal environments near the Pacific coast, its few species being about equally divided between such territory in Lower California and southern California and in Ecuador and Peru.

For the present study, beside Svenson's collections at the Brooklyn Botanic Garden (B.B.G.) and material at the Academy of Natural Sciences of Philadelphia (A.N.S.P.), specimens have been kindly lent me from the Chicago Natural History Museum (C. N. H. M.) and the United States National Herbarium (U.S.N.H.).

(*A*) *A new Stemodia from northern Peru*

There appear to be two species of true *Stemodia* L. along the coast of Ecuador and northern Peru. One of these is the widespread tropical weed, *S. durantifolia* (L.) Sw., the other a species new to science from the Amotape Hills of Piura, northern Peru. They are alike in aspect, being glandular herbs, with many clasping serrate or serrate-dentate leaves, and with axillary clusters of short-pedicelled flowers, the lanceolate sepals being subtended by a pair of bracteoles, and the flowers succeeded by ovoid-conic capsules. They may be distinguished as follows:

A. Corolla violet-blue, strongly zygomorphic, pubescent over base of lower lip; bracteoles and sepals attenuate, linear-lanceolate, the former as long as the latter; leaves more sharply and saliently serrate, acuminate, yellowish green, the surface finely glandular-pubescent; stem erect, 5-10 dm. tall, much branched above, glandular-pubescent; plant annual. ....1. *S. durantifolia*

AA. Corolla white, scarcely zygomorphic, glabrous; bracteoles linear, acute, longer than the narrowly lanceolate acute sepals; leaves serrate-dentate with low teeth, acute or acutish, bluish green, the surface glandular-puberulent; stem probably 3-5 dm. tall, woody and branched below, glandular-puberulent to closely pubescent; plant perennial. ....2. *S piurensis*

1. **Stemodia durantifolia** (L.) Sw.

In situations at least temporarily moist, throughout this coastal area. Seen from the following localities:

Ecuador. Guayas: Guayaquil, *Luis Mille* 982 (A.N.S.P., C.N.H.M.).

Peru. Piura: Negritos, *Oscar Haught* F32 (A.N.S.P., C.N.H.M.); Talara, *Haught* 25 (A.N.S.P., U.S.N.H.).

2. **Stemodia piurensis** sp. nov.

Planta ut videtur perennis (ad basim lignosa, sed praerupta); caulis glandulari-puberulens aut minute-pubescens; folia oblongo-lanceolata acuta arcte serrato-dentata glandulari-puberulenta coerulescenti-viridia; pedicelli brevissimi; bracteolae lineares acutae sepalis longiores; sepala 4-5 mm. longa, acuta, anguste lanceolata; corolla 4-5 mm. longa, alba, glabra; antherarum cellulae paulum stipitatae; capsula 3 mm. longa.

Plant presumably perennial (the base apparently woody, but broken so that roots are not present, although shriveled remains of bases of stems of previous seasons persist, while the new growth of the present season forms an ascending stem 3 dm. long). Stem glandular-puberulent or finely -pubescent. Leaves oblong-lanceolate, acute, closely serrate-dentate with short outstanding teeth, glandular-puberulent, bluish green,[1] rounded-clasping at base, the largest 3 cm. long, 7-8 mm. wide, the lower somewhat narrowed proximally but the middle and upper scarcely so, these latter subtending flowers. Pedicels less than 1 mm. long. Bracteoles present, linear, acute, longer than the sepals. Sepals 4-5 mm. long, narrowly lanceolate, acute. Corolla 4-5 mm. long, white, glabrous throughout, lobes nearly equally distinct, the uppermost (formed by fusion of the upper petals) and the lowermost (mid-anterior) slightly the larger. Anther-cells slightly stiped. Capsule 3 mm. long, apparently conic.

Type, decumbent in river gravels, Quebrada Mogollon, Amotape Hills (4° 45′ S., 81° 15′ W.), Prov. Piura, western Peru, collected in flower March 28-30, 1941 by Oscar Haught & H. K. Svenson, no. 11542; in Herbarium Brooklyn Botanic Garden.

---

[1] At least, on drying seeming so, in comparison with *S. durantifolia*.

This may also be compared with *Stemodia maritima* L., of the coast of the West Indies and eastern South America, which it resembles in glabrous corolla and bluish green foliage, but that has bracteoles wider than the sepals, corollas violet-blue, anther-cells long-stiped, and leaves strongly and sharply dentate.

(*B*) *The South American Species of Galvezia*

The genus *Galvezia* pertains to the Antirrhineae, one of the most advanced tribes of the Scrophulariaceae, showing a nectar pouch on the lower side of the base of the tube and a capsule that dehisces by extensive transverse loculicidal distal ruptures as in *Linaria.* Its corolla is tubular and red, representing an ultimate state of floral evolution adapted to pollination by hummingbirds. Geographically it is a remote member of this dominantly Palaearctic tribe, our South American species being most remote of all. Finally, it is unusual for a genus of this family to have such a severed generic range, although the western Nearctic genus *Orthocarpus* also has its remote species in Peru while large-flowered members of *Mimulus* sect. *Simiolus* occur isolated in Chile.

Galvezia was proposed by Dombey, the French companion of the Spanish investigators of Peru and Chile, Ruiz and Pavon, in honor of Don José de Galvez, Administrator of the Indies, a high government official who had aided this botanical expedition. A record with Dombey's specimen at Kew Gardens shows that his plant was gathered in 1779 near Lima, Peru. Dombey returned from Peru in 1784, four years before his companions, and, in spite of official orders to the contrary, descriptions of various species were published from his collections ahead of the Ruiz & Pavon reports. In our case it was a generic description of *Galvezia* Dombey that appeared in Jussieu's Genera Plantarum (p. 119) in 1789. For this plant a specific name, *G. fruticosa,* first appeared in J. F. Gmelin's edition of Linnaeus's Systema Naturae (2: 937) in 1791. But Ruiz & Pavon thought that this *Galvezia* was actually a species of the Palaearctic genus *Dodartia* L., and so erected another *Galvezia* (in their Florae Peruvianae et Chilensis Prodromus, 56) in 1794 for a plant later placed in *Pitavia* Molina of the Rutaceae. Accepting their genus *Galvezia,* Chavannes in his Monographie des Antirrhinees (p. 180) in 1833 restored Dombey's genus but under a new name *Agassizia.* Thirteen years later Bentham (in DC., Prodromus, 10: 295, 1846) adopted again Dombey's name for this remarkable genus of Scrophulariaceae.

The South American species of *Galvezia* Dombey occur in the coastal "loma" vegetation of Ecuador and Peru. In habit one is a pronounced shrub, while another is largely (if not wholly) an annual herb. The corollas scarcely differ except in size; in all species they are tubular, red,[2] and the outer surface is pubescent. Sepals and capsules also seem nearly identical. But there are sufficient differences to characterize three species:

A. Corolla 12-15 mm. long, the lips about ⅓ length of tube; pedicels as long as, or longer than, the subtending leaves, often distally coiled; leaf-blades about 2 cm. long, on petioles about 2 mm. long; stem shrubby, widely much branched throughout. .... 1. *G. fruticosa*

AA. Corolla 18-21 mm. long, the lips about ½ length of tube; pedicels shorter than the subtending leaves (at least when latter are grown), distally incurved; leaf-blades longer; stems more virgately branched.

  B. Leaf-blades and bracts lanceolate, pinnately veined; stem, glabrous, or pubescent distally with glandless hairs slender, shrubby below. 2. *G. lanceolata*

  BB. Leaf-blades and bracts palmately veined (at least proximally); stem slightly to strongly glandular-pubescent, thicker and herbaceous throughout, the root often or always annual. ....3 *G. ballii*

1. **Galvezia fruticosa** J. F. Gmelin

Galvesia fruticosa J. F. Gmel. cur L., Syst. Natur, ed XIII, 2: 937, 1791. Refers to "Jussieu, gen. plant. p 119", which, under *Galvezia* Dombey, reads: "Caracter ex D. Dombey mss., & herb. Peruv." Type would be the specimen seen by Jussieu and therefore one now at the Museum d'Histoire Naturelle at Paris, France. Of this collection I have seen three sheets there labeled "Perou Dombey", and an accompanying manuscript description that gives the source: "habitat Lima ou in aridis semperflorens." An isotype from the "Herbier d'Ant. Laurent de Jussieu"[3] is at the Chicago Natural History Museum. Isotypes have been seen also at the British Museum (Natural History) and at Kew Gardens, the last labeled "Peru, Dombey, 1779". *Fruticosa* is an especially appropriate specific name.

Dodartia fragilis Ruiz & Pavor.[4] Syst. Veg. Fl. Peruv. et Chil., 1: 97, 1798. Based wholly upon *Galvezia* Dombey ex A. L. Jussieu. In the Madrid Herbarium is a collection labeled by Pavon: "Galvezia Limensis Jussieu Gen. pl. p. 119. Dodartia fragilis Fl. Per. Syst. veg. pag. 39", and from Lima. Of this a photograph was taken for the Field Museum of Natural History, with a print also at the Academy of Natural Sciences of Philadelphia. A duplicate of this and bearing the latter name is at the British Museum (Natural History). *Fragilis* is also an appropriate name, though even more applicable to *G. ballii*. Habitally, *Galvezia* bears some resemblance to the microphyllous broom-like plant of arid central Asia, *Dodartia*.

---

[2] The corollas of both *Galvezia fruticosa* and *G. ballii* are "carmine," as checked in Ridgway's "Color Standards and Color Nomenclature."

[3] Coming from Jussieu's herbarium one might consider that this would be the actual type, were it not for its lack of any corolla in anthesis, there being only buds and immature fruits.

[4] Name omitted in Index Kewensis

Agassizia limensis (Dombey) Chav., Monog. Antirrh. 180, tab. 11, 1833. "Hab. in Peruvia prope Lima (Domb.), Galvezia Limensis Domb. mss." This, the earliest, though unvalidated, specific name, was adopted by Bentham as *Galvesia limensis* Dombey, in DC., Prod. Syst. Nat. Regn. Veg., 10: 296, 1846.

Slopes, often stony, from sea-level to 2,000 meters altitude, along and near the coast of central Peru, known only from the Department of Lima. Seen from the following stations: Chosica, above Lima, *Verne Grant* 7392 (U.S.N.H); Lima, *Dombey, Pennell* 14288 (A.N.S.P., C.N.H.M., U.S.N.H.); Santa Clara, *A. Weberbauer* 1666 (A.N.S.P.); Santa Eulalia, *T. H. Goodspeed* 33107 (U.S.N.H.); Viscas, along Rio Chillon, *Pennell* 14316 (A.N.S.P.).

2. **Galvezia lanceolata** sp. nov.

Fruticosa, glabrescens vel glabra; folia opposita ternatave, lanceolata, petiolis 1-3 mm. longis; pedicelli patentes, 12-25 mm. longi; sepala lanceolata, 3-4 mm. longa; corolla 18-20 mm. longa, rubra, extus pubescens, labiis tubae dimidium longitudinis aequantibus; capsula 5 mm. longa, globosa.

Young growth finely pubescent with glandless hairs, but soon both stem and foliage glabrous. Stem slender, shrubby, branched, about 10 dm. tall. Leaves opposite or ternate, the blades lanceolate, attenuate, entire, 3.5-3.7 cm. long, 13-14 mm. wide, proximally rounded to petioles 1-3 mm. long. Pedicels from most leaf-axils, spreading, several times longer than the capsules, the younger slightly pubescent, all recurving near apex, 12-25 mm. long. Sepals lanceolate, attenuate, 3-4 mm. long, when young pubescent. Corolla 18-20 mm. long, as in other species deep red (presumably carmine), externally pubescent and pouched at base anteriorly, its lips about ½ length of tube. Capsule 5 mm. long, globose, rupturing transversely distally.

Type, above Aguas Blancas, on the road from Puerto Lopez to Los Peñas, Province of Manabi, Ecuador, collected in flower and fruit July 9, 1942 by Oscar Haught, no. 3386; in Herb. Academy of Natural Sciences of Philadelphia, isotype in United States National Herbarium.

Along the west coast of Ecuador. This doubtless includes also Sinclair's collection from "Mante", cited below under *Galvesia limensis grandiflora*, since Manta is also in Manabi.

3. **Galvezia ballii** Munz

Galvesia limensis grandiflora Benth. in DC., Prod. Syst. Nat. Regn. Veg. 10: 296, 1846. "In rupibus Columbiae ad Peyta (Hall! Gaudichaud!) et Mante (Sinclair!)." Type, as preserved in Herb. Kew Gardens, was collected by [Francis] Hall "growing in tufts in the dry ravines and rocks of Payta [Peru]—corolla dark crimson." It was doubtless from this that Bentham described the color as "corolla kermesina".

Galvesia ballii Munz in Proc. Calif Acad. Sci. 15: 379, 1926. “*G. limensis* Domb. var *grandiflora* Benth. . . . Ball, Jour. Linn. Soc., 22: 151, 1887.” Munz intended to raise to specific rank Bentham's variety, but changed the name because of “G. grandiflora (Kell.) Benth.”. which had been given by Wettstein (in Die Natürl. Pflanzenfam., iv, 3b: 61, 1891) as the name of a Californian species. I agree with Munz that Wettstein's reference is too garbled for recognition. But I think that, because of a new description accompanying a new name that refers definitely to his collection, we must take Ball's plant now as type. Munz cites “Ball in 1882”, a collection from Payta, as seen in the Gray Herbarium and at the New York Botanical Garden, and one of these specimens should become the actual type. I have seen an isotype in the United States National Herbarium that bears date of April 13, 1882. John Ball discusses this plant in his “Notes on the Botany of Western South America” (in Jour. Linn. Soc. London (Bot.), 22: 151, 1886), saying that it was “found flowering in some abundance in the little gullies that descend from the plateau to the sea-beach close to Payta.” Fortunately, the types of both this and the preceding are from the same locality, and I have also gathered topotypes at Paita “on shale cliff above beach” July 4, 1925, my number 14810.

Plant (as I have seen it growing and as confirmed by specimens studied) herbaceous, with thick stem (that is thickest at base) and apparently with annual root. But it has been recorded as shrubby by Weberbauer and Svenson, and by Haught as either herbaceous or shrubby according to situation. One might suppose that two species were involved, were it not that the wide leaves and glandular pubescence seem so characteristic and evident on all collections.

Sandy or shaly soil, along the coast of northern Peru from the Department of Tumbez to that of La Libertad. Seen from the following stations: Tumbez: Cancas, *A. Weberbauer* 7752 (C.N.H.M., U.S.N.H.). Piura: Negritos, *O. Haught & H. K. Svenson*, 11610 (A.N.S.P., B.B.G.); Paita, *Ed. Andre* 4119 (C.N.H.M.), *J. Ball* in 1882 (U.S.N.H.), *T. D. A. Cockerell* in 1925 (U.S.N.H.), *Pennell* 14810 (A.N.S.P., C.N.H.M., U.S.N.H.), 14813 (A.N.S.P.), *H. H. Rusby* 2504b (U.S.N.H.); Talara, *Oscar Haught* 13 (U.S. N.H.), *I. M. Johnston* 3502 (A.N.S.P., C.N.H.M.). La Libertad: Chicama Valley, *E. Graywood Smith* 68 (A.N.S.P., U. S.N.H.).

NOTULAE NATURAE

NUMBER 180 OF JUNE 21, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTION OF A NEW DEEP-WATER ANGLER (CHAUNACIDAE) FROM OFF NEW JERSEY

BY HENRY W. FOWLER

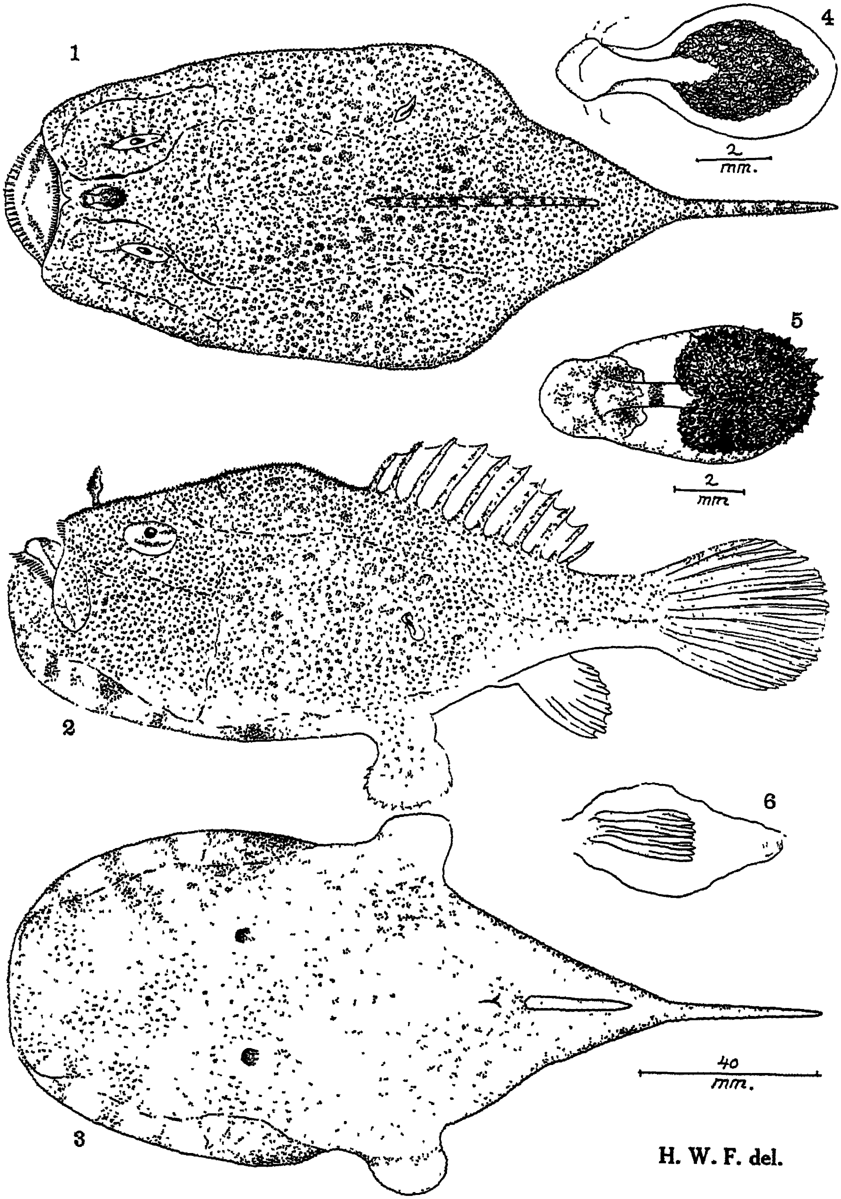
Curator of Fishes, The Academy of Natural Sciences of Philadelphia

The new species described below was secured from a trawler during the past early spring, by Mr. Carroll B. Atkinson, of Ventnor, who presented it to the Academy. We are again indebted to this gentleman for this interesting donation to the museum, and especially so as he was enabled to forward it in very fresh condition. Although the East Atlantic species, *Chaunax pictus* Lowe has several times been recorded from off the Atlantic Slope of North America, few of the accounts give very critical descriptions or satisfactory figures.

Chaunax stigmaeus new species

Figures 1 (dorsal view), 2 (lateral view), 3 (ventral view), 5 (dorsal view of bait) and 6 (right retracted ventral fin, dissected out); 4 *Chaunax pictus* Lowe (dorsal view of bait of Natal specimen).

Depth (retracted) $2\frac{2}{3}$; head (from snout tip) $1\frac{3}{4}$, greatest width of body at gill opening $1\frac{1}{4}$. Snout broad, length (in profile) $5\frac{1}{3}$ in head; eye supralateral, $1\frac{1}{5}$ in snout, $1\frac{4}{5}$ in interorbital, without free lids and pupil small; maxillary 3 in head, expansion $1\frac{2}{3}$ in eye; mouth large, closed mandible protruding in front; teeth in jaws in bands, broader upper band with about



H. W. F. del.

Chaunax stigmaeus new species. Figs. 1 to 3.—Dorsal, lateral and ventral views. Fig. 5.—Dorsal view of bait. Fig. 6.—Retracted ventral fin.

Chaunax pictus Lowe. Fig. 4.—Dorsal view of bait.

4 irregular series, narrowing towards side of jaw and many of inner or larger ones more or less depressible; lower teeth similar to upper, only with some of inner ones slightly longer than those above; teeth on palate in an arc of 4 continuous elongated narrow bands, with the inner pair nearly twice as long as outer pair, also all much smaller than in jaws and uniformly villiform; interorbital width 3⅔ in head measured from snout tip, little convex. Gill opening about half length of eye diameter.

Very pliable skin loose, forming folds over most of body and head, quite soft and apparently more extensively pliable on abdomen and the under surfaces. Skin with minute asperities or spinules and of fine velvety texture. Lateral mucous system prominent and together with lateral line best defined with reference to the accompanying drawings; canals indicated by more or less continuous or slit-like indentures in the velvety or asperous epidermis; extends back to join line upward from lower side of head, but not extending upward in postocular region to join lateral line.

D. I—11, spine as seen in front with terminal cutaneous portion an elongated lobe, gray black in color and behind brilliant white, stalk or ray rose with 2 darker rings and its length subequal with eye; third dorsal ray equals interorbital width and fin base length 1½ in predorsal length; A. 5, fin length 3 in predorsal and depressed fin reaches ¾ to caudal base; least depth of caudal peduncle 1⅓ in its length; pectoral rays 14, fin small.

Color when fresh in alcohol with entire back, sides and upper surfaces dull olivaceous brown, marked or specked with innumerable and variable small dark olive markings. These markings also extend on the dorsal, caudal and pectoral fin rays, though their membranes are all more or less red to vermilion. Moreover the back and sides also have variable suffusions of shades of red. Iris deep rose red. Naked skin around maxillary and lips all more or less red or orange. Under surface of head and abdomen with brighter red and orange to rose tints, along lower side of head 4 vivid rose red blotches with adjacent vermilion and orange tints. Upper basal portion of pectoral with bright light olive blotches, the separating intervals more or less vermilion and on under side of each fin a transverse indistinct rose red bar. Anal red.

A.N.S.P., no. 71726. Eighty miles southeast of Atlantic City, Atlantic County, N. J., in about 80 fathoms. March 1, 1946. Length 200 mm. Type.

Compared with a specimen of similar size of *Chaunax pictus* Lowe, from southeast of Natal, South Africa, in 235 fathoms, obtained in 1935, that species differs in the advanced hinge of the bait, as shown in the accompanying figures, the longer pectoral rays, the coarsely roughened or asperous skin, which is not free or pliable on the predorsal but firmly adherent, and with the rugae somewhat enlarged. Color largely light brownish with only a few scattered dark specks or small spots.

Lowe's type of *Chaunax pictus* was 405 mm. long and is figured without indication of the ventral fins, though they are described as " close together, very forward, quite under the throat " in his first account, and subsequently he adds " they are rather small and of a singular narrow elongateo-spatulate form, thick, smooth and fleshy, with only four rays, which are quite discernible to the eye." Details at variance with the present species are the truncated caudal fin, well shorter than the caudal peduncle, anal shown as reaching less than half way to the caudal base, no fringes on the edges of the jaws, gill opening more posterior, maxillary would reach nearly half way to pectoral base, eye with larger circular pupil, pectorals well before dorsal, bright orange with rosy on flanks, sides, lips and fins vermilion, finely mottled or reticulated with vermilion on yellow on whole upper surface of body.

Chaunax apus Lloyd[1] based on a specimen 110 mm. long, reddish yellow, has the ventral fins and the bait represented by minute rudiments. I hardly agree with Barnard who says under *Chaunax*[2] that the so-called " species " are ill-defined and really all belong to one widely distributed species.

(*στιγμαῖος* speckled.)

---

[1] Mem. Indian Mus., vol. 2, no. 3, August 1909, p. 169, text fig. 6 (pelvic fins A of *C. apus*, and B and C of *C. pictus*), pl. 45, fig. 6 (type locality, Bay of Bengal off Akyab, in 530 fathoms).

[2] Ann. South African Mus., vol. 21, pt. 2, Oct. 1927, p. 1003.

NOTULAE NATURAE

NUMBER 181 OF JUNE 28, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON BAHAMA FISHES WITH A DESCRIPTION OF A NEW JAW FISH (OPISTHOGNATHIDAE)

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

The small collection here reported was obtained for the Academy by Mr. H. G. Chaplin, while on a visit to Nassau during January of 1946. We are indebted to Mr. Chaplin for this interesting gift, as well as some crustacea and mollusca he also donated to the museum. The collection of fishes comprises 89 specimens which I refer to 23 species, one of which is described as a new genus and species. Unless otherwise stated, they are labeled as from the north beach of Hog Island.

The literature pertaining to the fishes of the Bahamas has been noticed in Results of the Fifth George Vanderbilt Expedition (1941), with a list of recorded species.[1] References are cited under four of the species listed in the present paper as I have not given them previously.

DASYATIDAE

Urolophus jamaicensis (Cuvier)

Color in alcohol with innumerable, small, uniform, golden spots, crowded and defined by narrowly blackish lines; also each side of mid-line 4 or 5 series of paler round spots or rings, superimposed and large as spiracles. Golden spots extends back over caudal fin. Below, body whitish medially, under surface of each pectoral yellowish buff, and marginally broadly flaked with small gray specks. One, 178 mm.

---

[1] Acad. Nat. Sci. Phila., Monographs no. 6, 1944, pp. 62-68, 433-451.

ECHIDNIDAE

Lycodontis moringua (Cuvier)

Chin, throat and belly more or less spotted and speckled with brown. Edges of confluent vertical fins narrowly white. One, 353 mm.

OPHICHTHIDAE

Myrichthys oculatus (Kaup)

Color in alcohol with back olive brown. Two ill-defined rows of large blackish spots, each with small yellow central spot. Under surface of body brilliant golden yellow. Small dark spots on head and muzzle, each also with small central yellow spot. Dorsal largely yellowish, margin narrowly pale yellowish, with dark brown submargin and entire fin with small, ill-defined and obsolete dark spots. Anal only developed posteriorly, yellow. Pectoral whitish. One, 625 mm.

CYPRINODONTIDAE

Cyprinodon laciniatus Hubbs and Miller

Cyprinodon laciniatus Hubbs and Miller, Occas Pap. Univ. Michigan, no. 458, Feb. 11, 1942, p. 1, fig. 1 a-c (teeth), fig. 1 (scale), pl. 1 (photos) (type locality, Lake Cunningham, New Providence Island, Bahamas).

Forty-one 18 to 39 mm. (of these 3 adult males 33 to 39 mm.). Lightborne Creek mangroves, New Providence, March 22, 1946.

Cyprinodon baconi Breder[2] is very similar, apparently differing chiefly in coloration, though the original account contains little about the details of coloration of the male.

POECILIIDAE

Gambusia hubbsi Breder

Gambusia hubbsi Breder, Amer. Mus. Novit., no. 719, May 4, 1934, p. 1, fig. 1 (lateral view), fig. 2 (upper. gonopodium) (type locality, Andros Island, Bahamas).

Seventeen, 20 to 32 mm., of which only 2 appear to be males (20 to 30 mm.) but the gonopodium is not sufficiently developed to make a critical comparison with Breder's figures. My specimens all have more or less small axial inky black spots on the tail, which may also extend forward on the trunk. Usually a variable cluster on the caudal fin. Often the body spots are variable on the two sides of the same fish, and usually seem to form an irregular more or less longitudinal dispersal. Dark spot below eye inconspicuous and more or less posterior from the lower eye edge. Lightborne Creek mangroves, New Providence, March 22, 1946.

---

[2] Amer. Mus. Novit., no. 551, Aug. 15, 1932, p. 1, fig. 1 (type locality, Lake Forsyth, Andros Island).

The reference for *Gambusia affinis* Baird and Girard by Lee 1889, Bean 1905, Rosen 1911, are likely misidentifications, perhaps for the present species or for *Gambusia manni* Hubbs. The last is said to lack black specks.

HOLOCENTRIDAE

Holocentrus vexillarius Poey

Color when fresh in alcohol largely brilliant rose or carmine. Dark brown longitudinal lines in scale junctures, all narrow, 3 above lateral line, 6 below. Iris rose. Head below and belly white. Spinous dorsal dark rose, with broad black blotch over first 2 membranes and resolves on other membranes as submarginal and basal tinge of gray black. Soft dorsal and anal golden brown, spinous fin and membranes rose. Caudal with longitudinal upper and lower vermilion longitudinal band, fin otherwise golden. Larger specimen with rather large black axillary blotch on its upper extent. Two, 59 to 62 mm.

ATHERINIDAE

Atherinomorus stipes (Mueller and Troschel)

One, 73 mm.

LUTJANIDAE

Lutjanus griseus (Linnaeus)

Color in alcohol drab above, but contrasted with milk white median blotch before interorbital and larger one before each eye; also only on left side large white blotch below eye and several white spots on posterior half of head. Fins all more or less greenish yellow with drab or gray spots on dorsals basally. One, 69 mm.

Lutjanus apodus (Walbaum)

One, 80 mm. Fins all greenish yellow. Both this and preceding with blue line along side of head close below eye.

GERRIDAE

Eucinostomus havana (Nichols)

Xystaema havana Nichols, Bull. Amer. Mus. Nat. Hist., vol. 31, art. 18, Aug. 2, 1912, p. 189, fig. 2 (type locality, Marianao Beach, Havana, Cuba).

Eucinostomus havana Longeley and Hildebrand, Papers Tortugas Lab., vol. 34, 1941, p. 140 (Tortugas).

Color in alcohol with back gray, sides and below overshot with bright silvery white. Tip of spinous dorsal blackish, fins otherwise all whitish. One, 100 mm.

Though in this specimen the dorsals and anal with broad basal scaly sheaths, also the caudal and paired fins are densely scaled. These last, however, are not so shown in the original figure. Moreover it shows 4 rows of scales on the cheek, while my specimen has but 3.

Eucinostomus argenteus Baird and Girard

Two, 68 to 105 mm.

Gerres cinereus (Walbaum)

Color in alcohol silvery with 6 obsolete dark gray narrow transverse bands on sides. Iris pearly gray. Dorsals and caudal yellowish buff, also paired fins and anal bright chrome yellow. One, 44 mm.

POMACENTRIDAE

Abudefduf saxatilis (Linnaeus)

Two, 77 to 82 mm.

Pomacentrus fuscus fuscus Cuvier

One, 84 mm.

Pomacentrus fuscus leucostictus Mueller and Troschel

Four, 34 to 75 mm. All with bright yellow to orange caudal peduncle, caudal more or less of same suffusion over at least hind part of soft dorsal and anal.

LABRIDAE

Halichoeres radiatus (Linnaeus)

Color in alcohol dark violaceous longitudinal band from snout, through eye to mid caudal base. Another parallel from preopercle along below pectoral base back to caudal peduncle below. Iris golden. Violet red band across hind part of mandible. Vertical fins orange red. Caudal vermillion basally and upper and lower hind edges dark gray. One, 142 mm.

SCARIDAE

Scarus caeruleus (Bloch)

Upper row of cheek scales largest and 2 scales on preopercle flange. Caudal emarginate. Color in alcohol brownish. On 4 lower rows of scales each with pale crimson median streak on trunk to front of tail. Head with crimson tinge below. Iris pale greenish yellow. Dorsals and caudal grayish, former with obsolete darker submarginal band. Anal pale, with basal and submarginal gray band. Paired fins pale yellowish. One, 175 mm.

OPISTHOGNATHIDAE

UPSILONOGNATHUS new genus

Type *Upsilonognathus chaplini* new species.

Body moderately elongated, trunk uniformly deep and tail little tapering. Head little wider than deep. Snout very short, obtuse. Eye large, far advanced in head. Mouth large. Maxillary horizontal, reaches middle of head. Teeth largely uniform, in narrowed bands to uniserial in jaws. Gill opening widely cleft. Gill rakers lanceolate, long. Scales rather large, obscure or imperfectly defined on top and sides of head. Muzzle, breast and space along base of spinous dorsal scaleless. Lateral line high, coextensive with base of spinous dorsal, with about 35 tubes. Spinous dorsal with stiff, pungent spines, though slender and graduated slightly from first to eleventh. Soft dorsal little higher than spinous fin. Anal opposite soft dorsal, little longer. Caudal shorter than head, rounded posteriorly. Paired fins subequal, little shorter than caudal.

Allied with *Lonchopisthus* Gill in its stiff and pungent spines in the dorsal fin, scaly cheeks and opercles, and in the fin formulae. It differs, however, in its greatly larger scales, fewer gill rakers, greatly shorter caudal fin and distinctive coloration. According to Jordan and Evermann the caudal of *Lonchopisthus* is lanceolate, long and pointed as in *Gobius oceanicus*. They[3] describe *Lonchopisthus micrognathus* (Poey) the genotype, with head 5 in the total length, greatly smaller scales 80, maxillary reaching half an eye diameter behind eye, eyes 3 in head, 20 narrow whitish vertical bands from back to belly, the first 2 on cheek and 3 on opercle, and fins colored like the body. Although they state, "only the types known, examined by us in the National Museum", they give no evidence of comparison with Poey's account, which they quote.

(Υ, ψιλόν the twentieth letter of the Greek alphabet, from the black lower border of the closed gill openings as viewed from below + γνάθος jaw.)

Upsilonognathus chaplini new species

Upper figure (head above), middle figure (lateral view) and lower figure (head below).

Depth 4; head 2½, width 1⅔. Snout (in profile) 2 in eye, its tip forming below level of lower eye edge; eye 4, enters upper front profile; maxillary 2, reaches nearly an eye diameter beyond eye, expansion 1⅗ in eye; mouth subhorizontal, closed jaws about even in front; teeth simple, pointed, close set and in each jaw a principal row formed, external at front of each jaw as also a short inner series or very narrowed band of slightly smaller teeth formed; lower principal or outer row slightly larger than upper teeth; palate toothless; interorbital narrow bony frenum. Gill opening wide, extends forward until opposite hind edge of eye. Gill rakers 9 + 19, finely and slenderly lanceolate, about ⅗ of eye; gill filaments ⅓ of longest gill rakers.

Scales 32 in lateral series from gill opening to caudal base and 3 more on latter; 15 transversely from above origin of anal fin to soft dorsal base. Scales much smaller each side and above ventral bases and on belly. Scales on predorsal, cheek and opercle little distinct, head otherwise largely naked. Of fins, scales only present on caudal base.

---

[3] Bull. U. S. Nat. Mus., no. 47, pt. 3, 1898, p. 2286.

D. XI, 14, spines firmly pungent, first 5¼ in head, last 3⅓, first ray 2$\frac{3}{7}$, eleventh 2; A. III, 14, I, fourth ray 2⅞; least depth of caudal peduncle 3⅗; caudal 1⅓, convex behind; pectoral 1¾, rays 13; ventral I, 4, spine 2 in fin, which is 2 in head.

Color when fresh in alcohol dull or pale drab with obscured whitish markings. Ten dark drab to blackish brown obscure ill-defined transverse bars on body. Head variably drab to dark drab, mottled and with irregular whitish blotches. Terminal portion of maxillary milky white, and contrasted with dark to blackish subterminal blotch, with several other small dark blotches along upper jaw. Mandible with several large whitish areas on each ramus. Branchiostegal region black. Inside mouth white. Eye drab, with darker blotches on iris. Groove of maxillary black. Blackish postocular blotch. Spinous dorsal with whitish border, below which longitudinal dark drab band broadens posteriorly from where it continues on soft dorsal, medianly as row of blackish spots, one before middle of each fin ray; along and below this 3 dark blotches basally on that fin; on outer half of soft dorsal some of median rays each with black spot. Spinous dorsal with four pairs of dark basal blotches. Caudal whitish, with transverse subbasal blackish band, rays crossed by 3 transverse rows of blackish spots. Anal whitish basally, terminally dark drab to blackish. Pectoral whitish. Ventral with broad whitish front border, rest blackish.

A.N.S.P., no. 71727. North beach of Hog Island, Nassau, Bahamas. January 1946. Length 58 mm. Type.

Characters contained in the generic account.

(Named for Mr. H. G. Chaplin, who collected the type.)

BROTULIDAE

Dinematichthys cayorum (Evermann and Kendall)

Color when fresh in alcohol with head and trunk brown, tinged with yellowish, which extended all over posteriorly, especially on the vertical fins. One, 50 mm.

GOBIIDAE

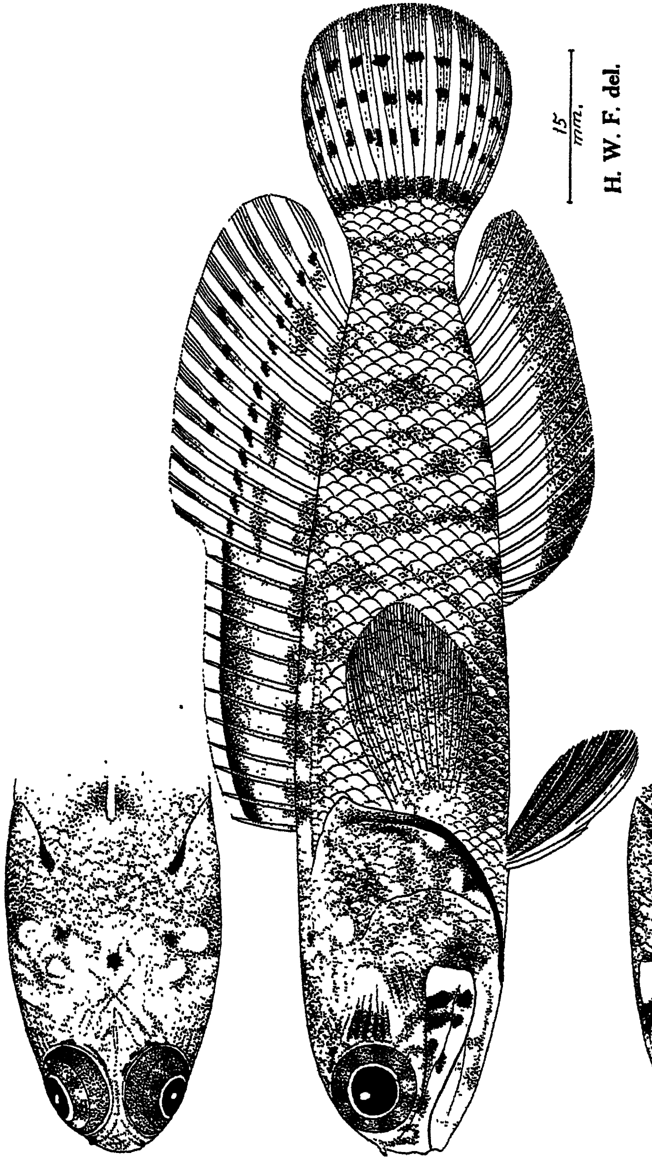
Mapo soporator (Valenciennes)

Five, 44 to 95 mm.

GOBIESOCIDAE

Arbaciosa fasciata (Peters)

Depth 5½; head 3½. Eye 3 in head, little longer than snout. Groove arched dorsally over front part of snout. D. 7, origin nearly midway between hind end of depressed pectoral fin and caudal base. A. 6. Back and above very pale brown. Six olive brown blotches on back, first at occiput


15 mm.
H. W. F. del.

Upsilonognathus chaplini new species.

and with second similar and largest, fifth at front base of dorsal and sixth at caudal peduncle. In intervals between dark saddles of back each with pair of olive or light brown vertical parallel bars. Dark brown bar forward and downward from eye, second arches up on cheek to lower edge of eye, and postocular and opercle with 2 dark brown bars, parallel and inclined backward. Caudal whitish, with transverse basal brown bar and another terminal. Dorsal and anal pale to whitish. Under surfaces of body immaculate, whitish. Pectoral brownish basally, pale terminally. One, 19 mm.

Agrees with Schultz's account.[4]

OSTRACIIDAE

Lactophrys trigonus (Linnaeus)

One, 88 mm. Largely yellowish brown. Two short blackish reticulated bars on side, first and larger from eye down behind pectoral. Iris and pectoral like body.

ONCOCEPHALIDAE

Oncocephalus vespertilio (Linnaeus)

Brown above, sides tinged with pale rose and under surfaces cream colored. Paired fins and anal on outer half of each fin violaceous black. One, 90 mm.

---

[4] Proc. U. S. Nat. Mus., vol. 96, 1944, p. (51, 55) 60.

NOTULAE NATURAE

NUMBER 182 OF OCTOBER 9, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW SPECIES OF WREN FROM COLOMBIA

BY

RODOLPHE MEYER DE SCHAUENSEE
Curator of Birds, The Academy of Natural Sciences of Philadelphia

Among the birds contained in a small collection sent to me for identification by Brother Nicéforo María of Bogotá, is a remarkable new wren belonging to the genus *Thryothorus*. It has no close relatives in the genus. For it I propose the name of:

Thryothorus nicefori new species

Type.—♂ ad., no. 31, collection of Brother Nicéforo María, collected at San Gil (south of Bucaramanga), Santander, Colombia, on November 19, 1945.

Description.—Crown, hind neck and upper mantle grayish brown (between Buffy-brown and Olive-brown*); lower mantle, back, rump and upper tail-coverts tinged with rufescent (Dresden-brown), the feathers obsoletely barred with black. Feathers of the lower back with a large, concealed, subterminal silvery white disc, edged with black, the feathers fringed with Dresden-brown.

Long supercilium, from the forehead to the nape, pure white, margined above and below with black. Sides of the head, ear-coverts and sides of the neck white, heavily striped with black.

Throat and upper breast pure white, gradually becoming suffused with grayish, darkest on the flanks and sides of breast. Some of the feathers at the sides of the breast marked with drop-shaped, subterminal white spots. Thighs obsoletely barred. Under tail-coverts broadly barred, black and white.

---

* Colors in capitals are those of Ridgway's Color Standards.

Wing feathers the same color as the lower back, barred with black on the outer webs. Greater wing-coverts outlined by a longitudinal, black subterminal line. Tail feathers slightly grayer and paler than the wing feathers and broadly barred on both webs with black.

Nostrils oval, open.

Measurements of Type.—Wing 71, tail 49, exposed culmen 19, tarsus 23 mm.

Soft parts.—Upper mandible horn, lower mandible white (in skin).

Range.—Known only from a single specimen from the type locality.

Relationship.—Brother Nicéforo's Wren, although not closely related to any known species, shows a color pattern most similar to that of *Thryothorus rufalbus*, but the coloration is totally different.

NOTULAE NATURAE

NUMBER 183 OF OCTOBER 30, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NEW CRUSTACEANS FROM THE LOCKATONG OF THE NEWARK SERIES

BY WILHELM BOCK

Research Associate, Department of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia

This paper is the second of a series of reports about fossils recently discovered in the beds of the Lockatong formation of the Triassic Newark series at the Gwynedd tunnel deposits on the Reading Railroad near Gwynedd, Pennsylvania, and at other near-by localities. New species of plants and vertebrates have been frequently reported, but crustacean fossils are rather rare. *Estheria* was found in the Newark series by Lea as long ago as 1856 and has been recorded from that series by other authors since, but the records are rather unsatisfactory. The tiny phyllocarid here described has not been found anywhere in the Triassic heretofore.

The new fauna and flora of the Gwynedd tunnel deposits of the Lockatong formation, show an interesting relationship to other Triassic groups, particularly to those of the Chinle formation of Arizona and to parts of the European Keuper. Although it is not the purpose of this paper to discuss the correlation of these formations nor the physical processes of their deposition, the fossils here described throw light on another problem of great importance, their facies. *Estheria* is known as a fresh-water genus, though not always recognized as such, while the Phyllocardiae are ordinarily marine dwellers. With the exception of a few apparent calcareous algae and a lone fossil of a small shark assigned to the family Cestraciontidae, which of course might have migrated into a river delta, no further evidence of a marine origin for this formation has been found. *Estheria* is also known to prosper in brackish water and lagoons, though this hardly could apply to the species described here as they were found together with calamites and bones of a fresh-water coelecanth fish. In some of the German Keuper beds, *Estheria* has often been reported with species of *Lingula* and marine mollusks. It is quite possible that our phyllocarid lived in brackish water and was floated into beds of otherwise fresh-water origin. *Estheria* has been considered an important index fossil of the lower Keuper of Europe and in particular of the " Lettenkohle ", a carbonaceous shale just above the " Muschelkalk ". The Chinle of Arizona appears to be non-marine, and the invertebrate fauna of the Triassic of Nevada indicates that its beds are at the base of the Chinle. The German " Lettenkohle ", which is known for its *Estheria* beds, is also close to the base of the Keuper, and was considered part of the " Muschelkalk " until it was finally incorporated in the lower " Keuper ". There are strong indications that the layers of the Lockatong which are filled with *Estheria* are similar in origin to the " Lettenkohle " of the German Keuper. There is also some evidence that the Lockatong area was inundated, though infrequently, by salt- or brackish-water because of the occurrence of the possibly marine species in it. If such indications are correct, the oldest phase of the eastern Triassic, the " Stockton " formation, might be comparable in origin to the " Muschelkalk ", but so far evidence of a marine character for the " Stockton " period is wanting. A formation similar to the German " Muschelkalk " has yet to be discovered in the Newark trough.

CRUSTACEA

BRANCHIOPODA

LIMNADIIDAE

Estheriella circularis new species Fig. 1, A, B; Fig. 2.

Description.—This specimen is represented by numerous individual valves, which are very rarely found in pairs. They are spread as thin impressions, with a shiny horny residue, over large layers of black shale and appear almost circular in shape with a slight convexity on the dorsal side around the umbo. The ventral side is defined by the circular curved margin of the largest concentric section, while the posterior and anterior sides are identically curved with slight protrusions where the individual sections appear somewhat to overlap each other. The height of an adult specimen is about 4.5 mm. while the width is 5 mm. The depth of a valve is approximately 1 mm.

The carapace consists, as in recent species of *Estheria,* of numerous concentric sections. They become considerably more closely arranged toward the dorsal side and gradually change toward the umbo in width and length from a circular shape to an elliptical one. The few best preserved specimens disclose on the outer surface 8 to 10 concentric sections defined by distinct ridges or steps. The maximum width of the largest section is 0.8 mm., often subdivided by 6 to 8 smaller secondary concentric lines, which become gradually less numerous in the smaller concentric sections, and finally vanishing in the dorsal portion. Each sharply defined primary ridge is about 0.1 mm. in width and 0.2 mm. in height, forming with the adjacent larger interspacial section a step, which defines primarily the curvature and depth of the valve. As the ridges become more widely spaced toward the ventral border, the surface appears plainer in this portion than near the umbo, which often projects considerably due to the close proximity of the concentric ridges. The cross section of the interspace is slightly concave and inclined toward the ventral margin.

Numerous radial lines, apparently centering at the umbo, cover the surface of the valve. They are most distinct on the ventral sections. The individual lines are about 0.5 mm. thick, of half round shape, and closely arranged. They overlap the ventral margin slightly, giving it the appearance of a minute serrate edge. These striae gradually fade away toward the umbo, but seem to cover younger specimens more fully. Many adult valves show these striae only on top of the ridges and on part of the preceding interspace. The vertical portions of the ridges are mostly bare of radial lines. There appears to be no subdivision of the striae as the rays are all of identical thickness, touching each other. The secondary concentric lines on the lower ventral sections are rarely found to have radial striae. There are about 15 to 20 radials per mm. and approximately 110 to 120 on a valve.

Conditions of growth.—Along the sides of the upper surface of some of the valves, one or the other concentric section protrudes and seems to overlap, indicating an individual growth of these sections. However, the interior side of the valve discloses that they do not grow in a molluscan fashion, but that the impetus of expansion originates from the adjacent ridge of the upper side. At the surface of the interior part, the same sectionalism is evident, however, the concentric intersections being convex and separated by a prominent narrow groove. The concentric lines on the surface of the larger concentric sections seem to be the base for the development of the primary ridges during the process of the growth of the new shell before the moulting of the old one. It should also be mentioned that they are seldom found covered with radial striae, which are prominent on the original ridges, indicating that the striae may be a protective cover at the early stages of growth but do not seem to participate in the continuing expansion of the concentric sections at later stages.

When the carapaces are found in great quantity, often in thousands spread over small sections of black shale, they do not always disclose the details of their structure. They appear as black shiny and wrinkled films about 0.01 mm. thick, often traversed by thin parallel cracks. When heated the chitinous films become brownish and often peel off. Specimens showing structural details are rare. Specimens of different stages of growth are present, and also numerous variations in shape, from a circle to a round oval outline. This species is also associated with a slender, oval type that is different in several features, but is doubtless closely related. Other remains consist of single ridges, the larger ones appearing to be the more indestructible parts of the shells. The umbo section is mostly wanting, suggesting a less resistant construction. No other parts than carapaces are recognized. Longitudinal, thin members, which look as though they might have had locomotive functions, are probably only fragments of the carapace.

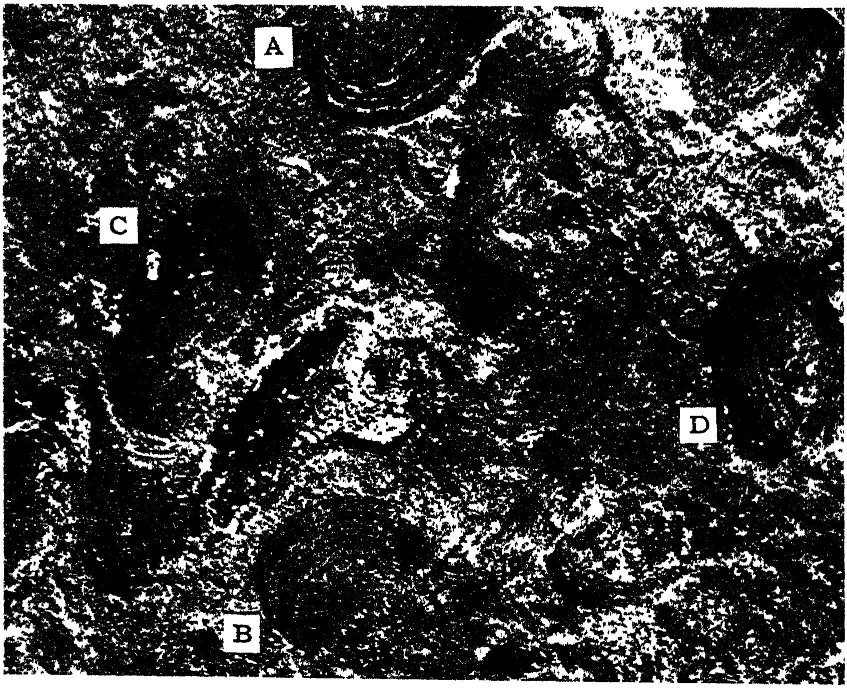


FIG. 1.—*Estheriella circularis* new species. A, paratype; B, holotype (x5). *Estheriella elliptoidea* new species C, holotype (x5); D, paratype.

Discussion.—Jones has described a form, *Estheriella radiata* (Salinas) var. *multilineata,* which seems to be similar to our species in outline. But the valves of that form are less circular and have a straight dorsal margin. The most pronounced difference is in the radial striae, which are considerably less closely arranged in Jones' form. Jones states that his variety has fine intermediate radials between the heavier ones, while our valves have a continuous cover of an evenly dimensioned and regularly spaced striae. The latter character indicates that the generic affinities of our species are with *Estheriella,* which was defined by Weiss in 1875. Jones has made comparisons of his form with other species, such as his *Estheria tegulata* and *Estheria tesselata,* which are also similar to our species. *Estheria elliptica* (Dunker) seems also to be related to *Estheriella circulata,* but lacks the pronounced radials. Weiss describes *Estheriella costata* from the Triassic " Buntersandstein " of Duerenberg. Though this species has more numerous radials than the Malayan *Estheriella* of Jones, the carapace is much smaller and is also somewhat quadrangular. Jones also points out that some species of *Estheria* show superficial striae on the concentric intersections of the valves without having true radials. However, we have found valves that appear to have the characters cited by Jones, but they also have complete true striae in some sections of the same valves. We have already pointed out that traces of striae on ridges or intersections apparently are the remains of true striae worn off or interrupted by later moults, which should not be confused with minute ornamental striae mostly imbedded between the concentric ridges.

Location.—These specimens were found in a quarry in the Upper Triassic, Lockatong formation near Eureka, Pennsylvania, about 8 miles from the Gwynedd tunnel deposit. They occur in numerous closely arranged layers in a band of black shale about 10 inches thick. Other fossils, which appear to be the valves of fresh-water mollusks, are found with them, as well as remains of plans such as *Equisetites* and a species of calamite. Coprolites of *Estheria*-eating vertebrates of fair size are abundant. This band of black shale occurs in a hard, gray argillite which contains many large groups of calcite crystals. Though the quarry is about 40 feet deep, there are no other dark sediments between the beds of grayish argillite.

Bock collection, Academy of Natural Sciences of Philadelphia. Holotype, A.N.S.P. 16847.

Estheriella elliptoidea new species Fig. 1, C, D.

Description.—This specimen is represented by about half a dozen well flattened single valves of bright, black, chitinous consistency. They are associated with the above-described *Estheriella circularis* on a small piece of black shale. The valves have a pronounced elliptical shape, and the adult specimen measures 3 mm. in height and 8 mm. in length. Some of them show a slight recess around the middle of the dorsal margin, giving the appearance of a kidney. In others the straight dorsal margin continues without any distinction or sharp corners to the well-curved posterior side and joins at the opposite side the similar and identically curved anterior side. The umbo is slightly shifted toward the posterior margin, whereas in other species it is more or less near the middle.

There are about 12 primary step-like ridges of the same elliptical shape as the valve in outline. They are subdivided into 3 to 8 secondary ridges so that there is a total of about 50 ridges to a valve. Each ridge is about 0.2 mm. in height and width, while the rather flat-appearing interspace, when not occupied by secondary ridges, averages 0.6 to 0.8 mm.

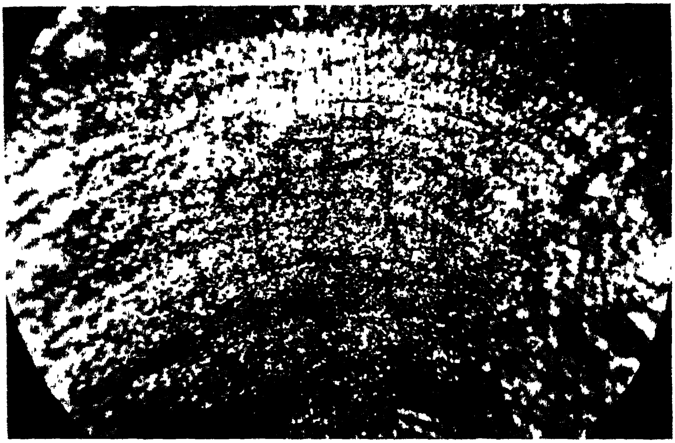


FIG. 2.—*Estheriella circularis* new species. Enlargement of Figure 1B (x30), showing the close radial striae and concentric sections.

The valves of this species are partially covered by closely arranged striae that are more pronounced on the larger concentric sections than they are in the middle and are hardly visible toward the dorsal edge. They are half cylindrical in shape, touch each other, and are about 0.05 mm. thick and overlap somewhat the ventral margin, which appears to be serrated. Only the surface of the primary ridges is covered by striae in some of the species, but faint traces of fine lines can be observed over the largest part of the surface of the valve.

Discussion.—*Estheria elliptica* (Dunker) is similar to our species in shape and in the arrangement of the ridges, but it lacks the true striae. However, Jones shows in his monograph of fossil Estheriae some enlarged concentric sections that show rod-like bars or wrinkles between the ridges which we consider to be ornamental If they were protective striae, they would probably be developed on the top surface of the ridges, but the latter are not invested with any ornamentation. The ridges of our specimen, particularly the larger ones, indicate these striae, even if the adjacent interspaces lack them. From our observations, the striae of our specimen appear to be a protective covering of the original valve comparable with that on the scales of ganoid fish frequently found in the Triassic. Ornamental wrinkles are also observed in recent Estheriae as pointed out by Baird (Proc. Zool. Soc., 1849, pp. 89-90). *Estheria similis* Baird displays a crenulation of the concentric ridges also. *Estheria ovata* Lea should be mentioned in this connection as it was found in the same formation at Phoenixville, Pennsylvania. However, it has no traces of true radial striae, though it often is shown with a prominent sculpture between the ridges that varies from closely arranged bars to a punctured pattern.

There is a pronounced difference between the two species in shape, in the number of ridges on the shell and in the striae, which seem to be finer in *E. elliptoidea.* Furthermore, this elliptically shaped species has been found also at another locality, where *Estheriella circulata* is lacking, so there appears to be good reason for considering the two as distinct species.

Location.—This species was found on the same matrix as the above-described *Esteriella circularis* and at the same locality near Eureka, Pennsylvania. The second locality mentioned above, where also some valves of the *Estheriella elliptoidea* were found, is about 6 miles west of Eureka, on a little creek, 4 miles east of Lansdale. The exposure is just above the surface of the creek and consists of beds of shattered and eroded yellowish shale with hard clay layers of white or yellow color between them. In this shale there are also examples of *Estheria minuta* described below and head bones of a coelecanth fish. A few feet under this soft layer there is a grayish hard shale bed, very resistant to erosion and similar to the argillite frequent in this locality.

Bock Collection, Academy of Natural Sciences of Philadelphia. Holotype no 16848.

Estheria minuta Goldfuss Fig. 3.

Posidonia minuta Goldfuss, Jahrbuch der Mineralogie, 1832, p. 227.
Posidonia minuta Rogers, Proc. Acad Nat Sci Phila, 1843, p. 249.
Posidonia ovata Lea, Proc. Acad. Nat. Sci. Phila., 1856, p. 77.
Posidonia multicostata Emmons, Geol. Rep. N. C., 1846, p. 337.
Estheria ovata Lea, Monograph of the Fossil Estheria. T. R. Jones. 1862.

Description.—The valves of these specimens are numerous and often well preserved, but are never found as complete carapaces. The form and structure varies widely, but they always show some features characteristic of the species. The shape may vary from as triangular a form as that of *Posidonia triangularis* Emmons to the ovate and almost circular shape shown by Lyell as characteristic of *Estheria ovata.* The hinge line is mostly straight, with a sharp umbo at the anterior end. The posterior side extends from the hinge line in a well rounded curve, while the contact of the anterior margin with the dorsal side is less rounded, the margin curving broadly toward the ventral edge. The ventral curve is about twice as flat as the lateral curves. The angle formed by the dorsal lines and the relatively straight portion at the beginning of the anterior side is always more than 90 degrees. The average height of a well developed valve is 4 mm., and the length 5 to 6 mm., though some young individuals are only 2 mm. in length and height. Some large though indistinct impressions from a quarry at Washington's crossing are about 10 mm. long.

The concentric sections also vary in number with the size of the individual valve, but there are 18 to 22 ridges in most cases. Toward the ventral margin they are more broadly spaced, but appear most prominent in the middle section. Each concentric section consists of a step-like ridge, the side toward the ventral margin being followed by the somewhat concave curved interspace. The average height and width of the ridge is 0.5 mm., and the width of the interspace is about the same. The umbo is often prominently elevated, and its maximum height which is reached in the first third of the dorsal region, is about 0.8 to 1.0 mm. The inside surface has the same form as the upper side except that it displays no ridges but only convex folds, separated by distinct dark brown grooves of about 0.05 mm. in width. The thickness of the valves, which are often pressed together in several layers, averages 0.1 mm. The thickness of a complete carapace appears to be about 2 mm., though the impressions from the Washington's crossing quarry indicate a thickness of as much as 4 mm.

True radial striae are absent, but some parts of the lower sides of the ridges show single rows of evenly spaced small holes, which are probably remains of the typical reticulate interspacial ornamentation of *Estheria minuta* Alberti. Otherwise, the interspaces are bare of any sculptural design. A rather pronounced radial bend is shown on the valves of some specimens about one third from the dorsal margin, interrupting the otherwise evenly curved surface.

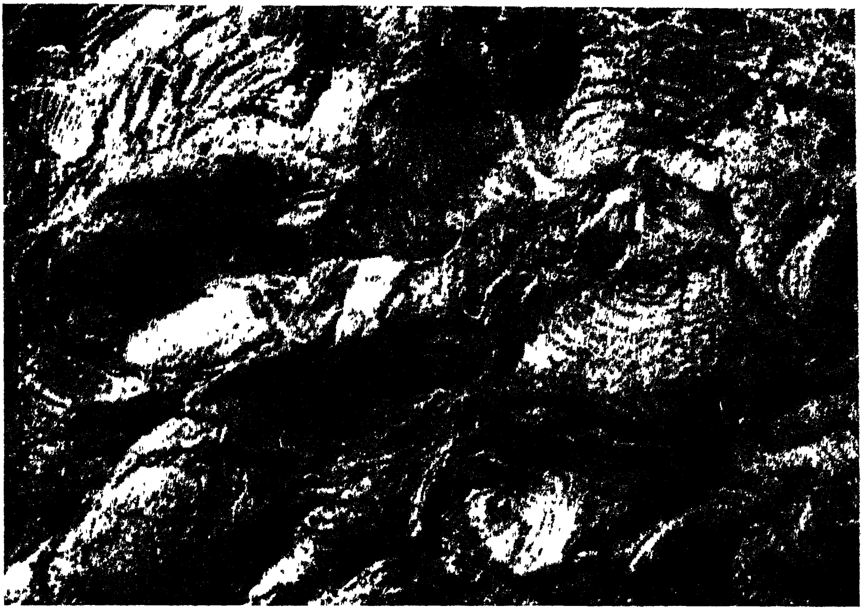


FIG. 3.—*Esthena minuta* Goldfuss (x5) Compressed layers of numerous values.

Discussion.—Though species of *Estheria* had previously been reported from the United States, no systematic account of them was available until T. Rupert Jones gave a comprehensive picture of the American occurrences and distribution of the genus in his Monograph of the Fossil Estheriae. 1862. Little has been published concerning them since. Jones mentions "*Posidonia minuta* Rogers 1854", of the Triassic of Virginia, and this species also was found by Lyell at Richmond and in the Dan River coal field. He described it as *Estheria ovata.* In 1858 Emmons reported two forms of *Estheria* which he called *Posidonia multicostata* and *Posidonia triangularis,* from the Triassic Deep River Series of North Carolina. In 1856 Lea reported *Posidonia ovata* from Phoenixville and Gwynedd, Pennsylvania. The last report of the species in Pennsylvania was apparently made by Wherry in Bulletin 828 of the United States Geological Survey, where he recorded small crustacean shells from calcareous beds at Wycombe, Pennsylvania, which he believed to be *Estheria ovata* Jones.

Though Jones admitted that the specimens from his different American localities varied considerably, he felt justified in including all of them in a single species *Estheria ovata.* We have not been able to locate Lea's specimens, nor have found any traces of *Estheria* yet at Gwynedd or Phoenixville. However, to judge from the published descriptions of the American species and our new species, some of them found near Gwynedd, we feel that Jones was justified in placing all the American *Estheria* in one species, but we see no grounds for calling them *Estheria ovata,* in view of the overwhelming evidence indicating that the specimens belong in an already well-established species, *Estheria minuta* Goldfuss, which has priority over the former though it is considered a specific but important representative of Europe. Apparently Jones wished to distinguish the American form of *Estheria* from the members of the genera found in other continents, but this had the disadvantage of obscuring stratigraphic correlations. Rogers described his *Estheria* as *Posidonia minuta.* Lyell figured *Posidonia minuta* from Richmond and also "*Estheria ovata*", the latter resembling very closely above-described *Estheriella circularis,* though apparently not having any radial striae. Lea, describing his *Posidonia ovata,* apparently was not aware of the existence of a similar species, described as *Posidonia minuta* by Alberti in 1837. The evidence presented by Jones in his monograph also indicates that his *Estheria ovata* Lea is identical with *Estheria minuta* Goldfuss. Figure 26, plate 2 of his monograph, labeled as *Estheria ovata* Lea is similar in shape, size and ridges to figure 28, plate I, which illustrates *Estheria minuta.* Another important generic characteristic, the reticulate ornamentation with 4 to 5 meshes, is also identical in both specimens. Though there are quite a number of variations in shape, which Jones himself repeatedly observed, preference should have been given to the older established name *Estheria minuta* Goldfuss rather than to the new species *Estheria ovata* Lea. This procedure also obscures the correlation between the different continents. As *Estheria minuta* has been considered for many years an important index fossil of the European Keuper, and particularly of the upper Lettenkohle, which occurs just below the middle Keuper, the discovery of this species in America would have been an important guide for stratigraphic correlation. We do not insist that some of the forms Jones grouped in one American species may not prove to be other than *Estheria minuta,* when good specimens are available, but the present evidence, including the discovery of new *Estheria minuta* beds in the Lockatong formation, makes it advisable to abandon Jones' use of the name *Estheria ovata* and refer the American specimens to *Estheria minuta* Goldfuss.

Location.—This *Estheria minuta* has been found in Montgomery township, Pennsylvania, at the crossing of Welsh Road and Evans Road, 4 miles east of Lansdale, on the sloped side of a little creek bed. It occurs there in shattered, well-eroded brown shale, imbedded with hard brown or gray clay. In the same layer were also found bones of coelecanth fish. The larger *Estheria* mentioned above was found in a quarry near Washington's Crossing, Pennsylvania in a prominent variegated shale, with rust brown clay layers, displaying well-formed vacuities previously occupied by the carapace.

Recently, two other localities were discovered with many *Estheria;* the first one is a quarry near Fair View village, Montgomery County, Pennsylvania showing impressions of apparent *Estheria minuta* Goldfuss on hard gray argillite, while the second find was made at an excavation on the Princeton University grounds for its new library building. Dr. Howell has found several specimens of similar shape to our above-described species assigned to *Estheria minuta* The matrix is also of similar consistency containing remains of coelecanth fish and numerous impressions of small ostracods.

CRUSTACEA

Phyllocarida

ECHINOCHARIDAE

GWYNEDDOCARIS new genus

Resembles *Pephricaris* Clarke, having abdominal spines, however, without the lateral carina of the carapace. The latter appears to be univalved in our genus. Main distinctions are the parabolic shape of the thoracic somites, and their articulating lateral appendages.

Genotype.—*G. parabolica* new species.

Gwyneddocaris parabolica new species Figs. 4 and 5.

This specimen, consisting of a carapace, somites, spines and caudal fork, was discovered with the carapace only exposed. The other portions were all uncovered by meticulous removal of hard black shale. Some of the interpretations of the anatomy are difficult and uncertain. Hence several interpretations are possible but those adopted herein are believed best to fit observations.

Description.—The total length of the specimen as it appears on the matrix is about 20 mm. While the remaining body has been deposited in a straight position, the carapace is somewhat turned to the right, otherwise indicating a natural disposition of the body portion without major distortions. The surface of the different parts, including the carapace, consists of a brilliant black, chitinous material, which easily splits off, disclosing another layer of less lustrous substance. The thickness of the carapace at these layers is about 0.1 mm., while the chitinous portion of the other parts appear to be thinner. The slender members, such as the spines, are all traversed by thin cracks, while the surface of the carapace shows rather irregular fissures. Some portions of the spines are covered with faint, minute tubercles.

The apparently univalved carapace (1) seems to be flattened out by sedimentary pressure and is superficially of quadrangular shape, but still preserves some of its original downward-curved outline at the lateral margins.[1] The approximate length is 6 mm. and the width 5 mm., which is the average size of an *Estheria* valve. The surface of the carapace is divided into three triangular sections, two lateral ones with a slightly convex surface and a third triangle wedged between the two former, terminating with its convexly curved front the anterior of the carapace. This central triangular section is slightly curved, showing a depression at the tip and an elevation toward the base of the triangle. The latter discloses at the anterior tip two small ridges 1 mm. long with a slight groove between them and a small pointed extension in front of them, probably representing the base of a rostrum which is broken off. The posterior tip of the central triangular section does not reach the posterior margin of the carapace. A prominent indented line extends from the posterior tip of the central triangular section to the posterior margin of the carapace and is 1.8 mm. long. This middle line and the central triangular section apparently form the tergum or cephalic region, while the two adjacent lateral sections with their slightly curved inside edges and downward-sloped outside margins, may represent the pleura of the carapace. It is not known whether the lateral margins were connected to form a ventral portion. The presence of other pieces (14 and 15) which are considered also as belonging to the carapace, makes it reasonably certain that there existed a ventral portion, which is obscured by the dorsal part of the carapace. A pointed conical section (16) about 2 mm. long, is considered to be part of the rostrum apparently dislocated from the carapace.

There are five, apparently thoracic, somites visible, although there may be others hidden under the carapace. Therefore, the first somite of this description (2) is merely the first visible one and is possibly not the first one anatomically. It is not fully shown and seems to be distorted by pressure. The second one (3) is of parabolic shape, about 3.5 mm. in width and length, and has a deeply concave posterior margin, which fits into or over the somite behind it. The edges are somewhat raised, and along the middle line exists a narrow elevation. The third somite (4) is of similar shape and size, having on each side a supplemental longitudinal

---

[1] Numbers in parenthesis refer to those inserted on Fig. 4.

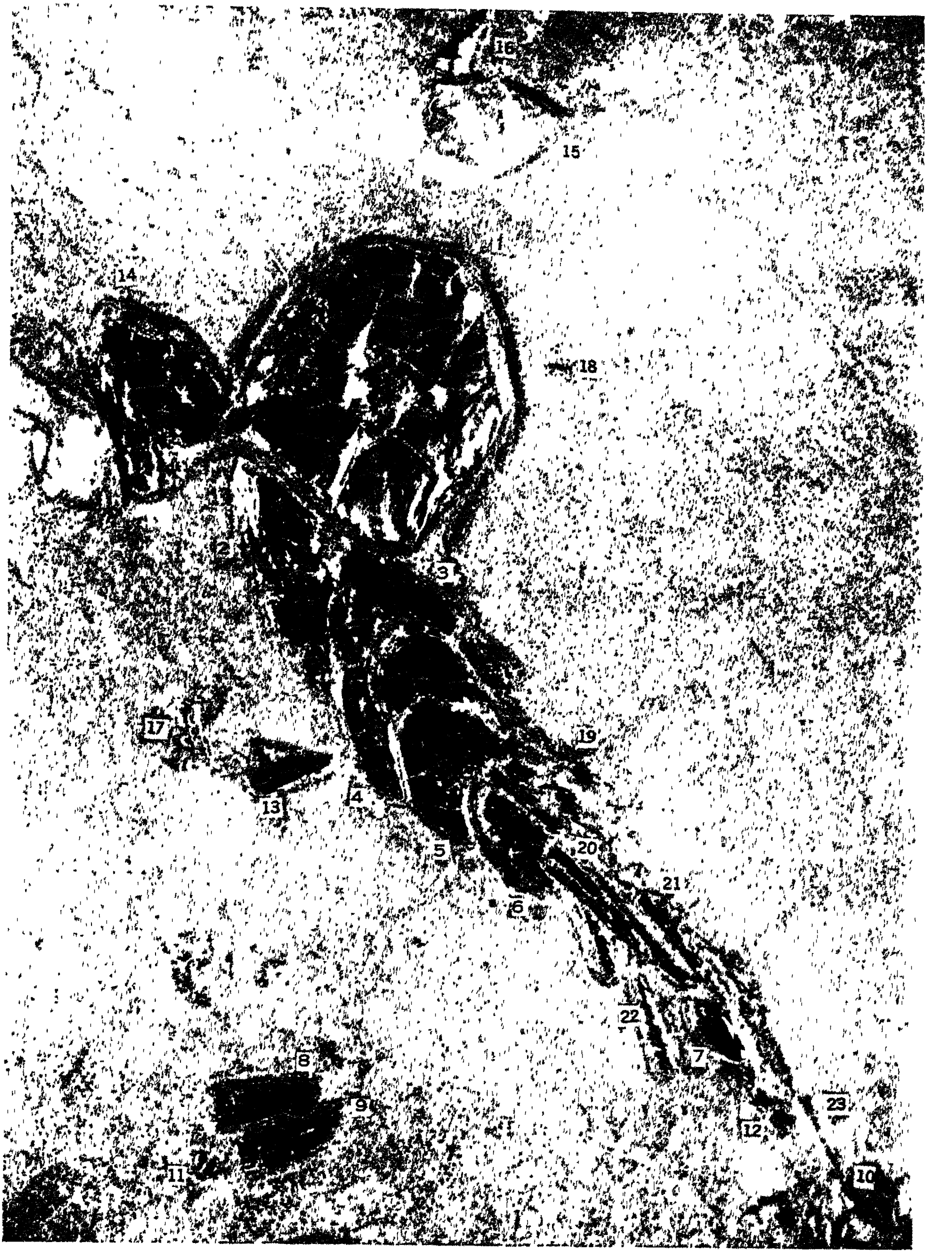


FIG 4.—*Gwyneddocaris parabolica* new genus and species (x6). Complete specimen.

section, the pleurum, which seems to be jointed at the upper inside margin with the tergum, slightly overlapping it. The one at the left side is well preserved. At the opposite side a similar flap, apparently the right pleurum is present, however, partially damaged. These elements, which are 3 mm. long and 1 mm. wide, represent lateral portions, i. e., the pleura, of a combined and articulated somite. At the second somite (3) there are also similar pleura present, but they are less distinct. The fourth somite (5) is similar to the third in shape, but the pleura apparently is rigidly attached to the tergum, forming one piece. The appendage at the right side of this somite is indistinct. The fifth somite (6) is only partially present clearly showing the left pleurum as in the preceding somite (5). A fraction of another somewhat smaller somite (7) located at the posterior end, probably belongs to the abdominal somites. It is conical in shape, obscure at the anterior side, and measures about 2 mm. in length. The two pieces (8) and (9) are suspected of being also abdominal somites or portions of them. They are likewise conical in shape, 2.5 mm. long and 1 mm. wide at the base. The surface is slightly convex and roughly ridged lengthwise, having at the end of the base a narrow section distinguished by 4 or 5 smaller ridges and separated from the ridges of the main part by a transverse indentation. This part may have been an overlapping section or joint. Nearby are several small quadrangular pieces resembling scales and consisting of two curved sections about 0.5 mm. in width and length. Others are also distributed at the caudal end of the specimen. Three pairs of them are arranged in a median succession (12) just below somite (7) and probably represent a protection for the ventral caudal section.

At the posterior end, an impression of a double spine (10) arranged on a small caudal plate at an angle of about 70 degrees, is clearly visible. Though these spines are rather short for a specimen of such length, and though there is no direct connection with the other portion of the body, it is reasonably safe to assume that this caudal termination indicates the true length of this phillocarid. The caudal spines are about 2 mm. long and 0.5 mm. wide at the base. The posterior ends are conically curved and pointed.

In the region between the last thoracic somite (5) and the caudal fork (10) there are a number of conical processes, which are pointed on one end and blunt or round at the base. They vary from 3 to 4 mm. in length and are about 0.8 mm. wide at the base, having an apparently round cross section. Their distribution is either parallel to the axis, or at a slight angle toward the posterior end. As they do not show any segmentation or any signs of joints, they should be regarded as segmental spines, which probably were attached to the somites, though no scars or bases are visible. The spines forming the caudal fork are half as long, but are of the same thickness and similar shape. It appears that the most anterior of these spines (19) originate in the gap between the fourth and fifth visible somite and may be extensions of the former. The next pair of spines (20) is located below the 5th somite (6) followed by two successive pairs (21 and

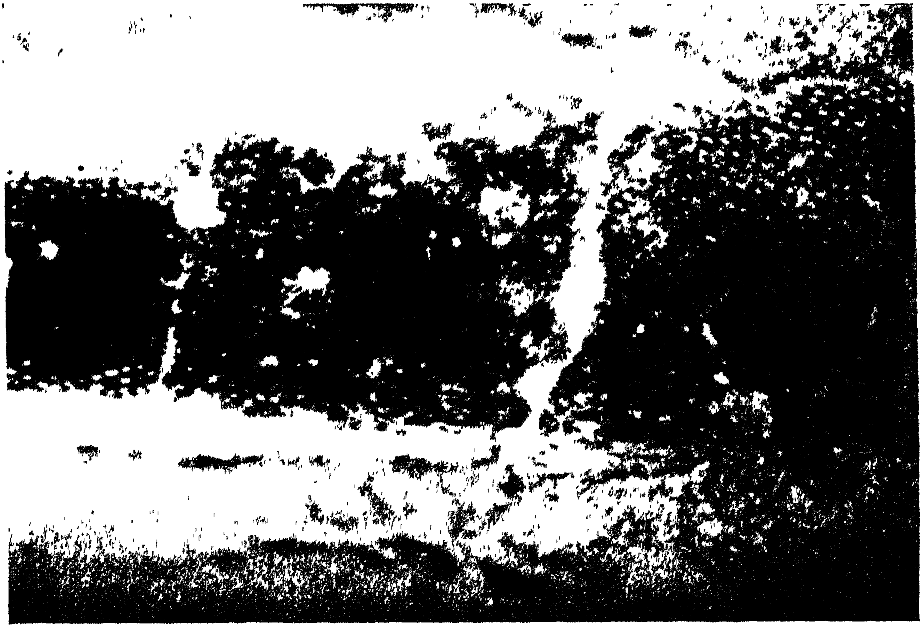


FIG. 5.—*Gwyneddocaris parabolica* new species Enlargement of part of Figure 4 (x170), showing rows of tubercles on spine 22.

22). No spine is visible at the last somite (7) but the impression of another spine (23) appears anterior to the caudal fork. From this arrangement, we can conclude that there were 6 pairs of spines disposed at the lower half of the specimen. If every pair of spines was arranged with a somite, there must have been 6 somites with spines making a total of nine with the three visible thoracic somites. The surface of the spines are covered with tiny tubercles, of about 0.001 mm. diameter, almost touching each other, and arranged in rows.

There are apparently no appendages present, with the exception of a single one, which has been damaged during the preparation of the specimen. This is a slender member (12) still indicated by some fragments and splinters located beside the longitudinal section of the third somite (4). A shorter piece attached to the first one (13) at a right angle and another slender piece connected to the blunt end of the preceding one, pointing slightly upwards, all being about 2 mm. long, show at the final termination two somewhat parallel short appendages (17) which are covered especially at the ends with hair-like striae. This appendage seems to be analogous to the antennules of the recent *Nebalia* Leach, a common phyllocarid probably related to our specimen.

There are a few obscure little pieces visible which cannot be identified, but there is a short straight member (18) that should be mentioned. It consists of three little sections about 0 5 mm. long which probably represent a portion of an antenna or a limb.

Discussion.—Though it was apparent from the beginning of the investigation that this small fossil belonged to the Malacostraca, it proved to be difficult to classify. Thanks to the suggestions of Dr. H. B. Stenzel of the University of Texas, who recognized the longitudinal elements as spines of a phyllocarid, it has been possible to trace it to a group of spinous crustaceans described by Clark as the Echinocharidae. He also described one species with spines on the abdominal segments *Pephricaris horripilata.* This phyllocarid has a caudal fork which is rather prominent and is larger than in our specimen. The arrangement of the somites with lateral appendages is not shown in any species described and it may be necessary to erect a separate family for our specimen. It also should be stated that the few phyllocarids known, were found in the Silurian and Carboniferous periods with the exception of one Triassic species, *Aspidocaris triassicus* Reuss of the Raible beds of Hallstadt in the Austrian Alps, showing the carapace only.

Location.—This unique specimen was found in the Gwynedd tunnel deposits of the Lockatong formation, Upper Triassic, at Gwynedd, Pennsylvania. The well-laminated black shale, in which it was found, contained also many complete fish and also the rare small reptile, *Gwyneddosaurus erici* Bock. From the species of fish found in this shale, and other evidence, it is certain that the shale is of fresh-water origin. It is rather surprising to find in fresh-water beds a phyllocarid, which usually has a marine habit.

Bock Collection, Academy of Natural Sciences of Philadelphia. Holotype 16850.

The writer is indebted for advice, suggestions and corrections of the manuscript to Dr. B. F. Howell, Princeton University, Dr. H. B. Stenzel, University of Texas, Dr. Horace G. Richards and Dr. H. B. Stuart, Academy of Natural Sciences of Philadelphia.

NOTULAE NATURAE

NUMBER 184 OF NOVEMBER 13, 1946

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE ANATOMY AND SYSTEMATIC POSITION OF MYZOBDELLA LUGUBRIS LEIDY (HIRUDINEA)

BY J. PERCY MOORE

In the Proceedings of this Academy for 1851 Dr. Joseph Leidy described a previously unnoticed leech as follows: "*Myzobdella* gen. nov. Body, elongated, compressed fusiform, smooth. Head continuous with the body, subindibuliform, obliquely ventrally terminal. Mouth central, unarmed. Acetabulum ventrally obliquely terminal, concave, not corneous. *Myzobdella lugubris* n. s. Body cylindro-fusiform, in transverse section, elliptical, black olivaceous green; anteriorly narrowed, cylindroid; posteriorly incrassate. From 15 to 18 annulations. Integument translucent, permitting the sacculated intestine of a black green hue, to be visible. Acetabulum circular, concave, a little larger than the oral disk. When elongated 10 lines, by ½ line in breadth posteriorly, ⅓ of a line anteriorly. Will contract to 4 lines by ⅘ line in breadth. Habitation. Parasitic upon the common edible crab, *Lupa dicantha* M. Edw. usually found attached about the base of the limbs."

No type material has been found and like most descriptions of leeches of that period there is little to distinguish the genus from related ones. In fact some of the terminology might suggest a trematode, which may explain why Leidy's paper is not listed in Autrum's very complete bibliography of Hirudinea (Bronn's Tierreichs, 1939). During the nearly full century since it was described nothing whatever has been added to our knowledge of it. It is very rarely mentioned in the literature and only as a mere listing. In his Invertebrate Fauna of Vineyard Sound, Verrill refers to it only as not having been found in New England. Nevertheless it is very common on the edible blue crab, now known as *Callinectes sapidus*, in the brackish coastal waters of New Jersey, Chesapeake Bay and North Carolina and probably wherever the blue crab occurs in both brackish and fresh waters. The specific habitat, together with the general accuracy and applicability of Leidy's description, make identification of the species certain and amplification of our knowledge is now possible and desirable.

The material on which this account is based consists of three lots, all taken from the blue crab: a few taken by the writer from the " creek " back of Avalon, New Jersey, in the summer of 1892 and now poorly preserved, four mounted specimens collected by Dr. A. S. Pearse at Beaufort, North Carolina and a larger number collected by Dr. Marvin Meyer at Solomons Island in Chesapeake Bay, Maryland, in 1941. To both of these zoologists I express my thanks.

External Morphology (Fig. 1).—The size and form of the leech is correctly described by Leidy but both vary greatly with the state of contraction and the amount of blood in the gastric caeca. When unfed they are more slender throughout, although the degree of development of the male and female gonads affects the diameter of the middle body region. When fully gorged with blood the extensive storage system of gastric caeca distends the entire urosome (abdomen of authors) greatly and increases the transverse, relatively to the dorso-ventral diameter, effecting a slight depression. As ingestion of blood causes not only a thickening but a lengthening of the caecal region, whereas the trachelosome (clitellar and preclitellar regions) undergoes no change, the ratio of the former to the latter is increased both for length and diameter. Under these conditions the form is best described as slightly flattened, clavo-fusiform. Leidy's use of " compressed " was probably a slip for depressed.

The head or cephalic sucker is an obliquely attached, ventrally facing, moderately cupped or funnel-shaped disk which, when fully expanded, is about ⅓ wider than the nuchal constriction or place of attachment. On its ventral face the center is a slightly elevated cone on the summit of which the minute mouth (*m*) opens, apparently in somite III slightly in advance of the eyes. The dorsal surface is divided into 5 distinct annuli which occupy about the posterior ⅗, the remainder being obscurely divided by usually 4 faint and incomplete cross furrows. In somite IV on the last head annulus or in the contiguous portions of this and the preceding annulus is a pair of widely separated pigmented eyes facing caudad. When contracted in preserved material the sucker is often more arched, hood-like and relatively more elongated, with a slight median anterior emargination, or it may be a mere ring not obviously wider than the following somites.

Immediately caudad of the cephalic sucker is a slight nuchal constriction formed by somite V and constituting a necklike excentric peduncle for the cephalic sucker. The remainder of the preclitellar region is circular in section, increases gradually in diameter and comprises somites VI to X*a2* inclusive, or 14 distinct primary annuli in all. Unlike that of many leeches, the clitellum (c-c) is neither conspicuously enlarged nor distinctively colored.

In some specimens, owing to the enlargement of the genital organs rather than to the glandular thickening of the body walls, the region is slightly enlarged but in most cases it is faintly narrower and recessed, the lines of demarcation being at the furrows X *a2/a3* and XII/XIII, including 7 or 8 primary annuli. As pointed out under *Annulation* there is some possibility that the caudal boundary may encroach slightly on somite XIII. The lines of demarcation are fairly distinct, the caudal being due to a slight swelling of the cephalic border of somite XIII, but with no enveloping collar or preputial fold and no conspicuously wider shoulders as found in those leeches in which the body is abruptly divided into two main parts (trachelosome and urosome of Meyer or neck and abdomen of authors). Nevertheless their homologues are clearly delimited by the position of the clitellum and the internal anatomy. The male gonopore is a large opening in the furrow XI *a1/a2* (♂) or slightly within the preceding annulus, from which the end of the atrium sometimes protrudes as a result of the eversion of the bursa. The female pore is a minute orifice, difficult to detect except in sections, situated in the furrow XI/XII (♀), two primary annuli behind the male pore. A mass of ducts of the clitellar glands opens on the venter of the clitellum and the integument surrounding the gonopores is somewhat thickened but there apears to be no very clearly defined copulatory area in relation to the female gonopore as in *Piscicola et al.*

The urosome is always fusiform, increasing gradually in diameter from the clitellum to somites XIX-XX and then tapering, at first gradually and then abruptly, to the caudal sucker at XXVII. The diameter varies greatly with the state of development of the gonads and the amount of blood in the gastric caeca. Young and unfed individuals are quite slender; mature and fully gorged ones are robust and the body walls tightly stretched and thin, conforming to the caeca. The five pairs of testes (*t1-t5*) appear as so many whitish bulges at the sides, somewhat simulating the appearance of lateral vesicles, which are totally absent. The dorsal extensions of the coelomic sacs in which they are enclosed are also somewhat raised and being whitish appear as incomplete pale bands. Somites throughout most of this region are complete and divided into 12 to 14 narrow annuli, with the anal ones (XXIV to XXVII) reduced. The anus (*a*) is minute and opens in the furrow XXVI/XXVII and is followed by three narrow annuli which are believed to constitute somite XXVII. Numerous small, sharply conical, sensory papillae are present on all annuli of the body and both suckers; some of them, especially when seen in profile at the margins, appear somewhat larger but have no regular distribution. There are no large papillae, tubercles or warts, and no metameric sensillae were detected.

The caudal sucker when fully expanded is about ⅓ larger than the cephalic sucker, much less than the greatest width of the body except on young unfed examples and moderately deeply cupped. On most of the preserved specimens it is strongly contracted to a narrow ring with a depressed center and faces caudo-ventrad to nearly caudad. The faint transverse furrows and ridges probably do not represent true annuli.

Metamerism and Annulation (Fig. 1).—Analysis of the central nervous system shows the presence of the 34 ganglia characteristic of leeches, namely: 6 in the cephalic complex, 21 separated in the ventral chain and 7 in the caudal complex. Those belonging to the head are crowded in a mass in somite VI, those of the caudal sucker lie behind the anus, the immediately preceding ganglion belonging to somite XXVII being separated by only a short cord. Except for the two end ones, VII and XXVII which are slightly displaced, the body ganglia lie in the middle primary annulus (*a2*) of their somites and in the absence of definite sensillae serve as the best criteria for determining metamerism. On the head, besides several faintly marked ones at the anterior end, are five clearly distinct annuli of which the last two, bearing the eyes, are somite IV, the others being somites I to III and the small prostomial lobe. Somite V is composed of two small annuli lying in the nuchal constriction. Following this on each of seven examples counted are 16 primary annuli to the male pore, allowing 3 each to somites VI to X inclusive and the last one to XI *a1*. These are variously divided; VI has only the 3 equally developed primary annuli; VII has 5 annuli, *a1* being undivided and *a2* and *a3* being divided into the 4 secondaries *b3* to *b6;* VIII has all 6 secondaries conspicuously and equally developed and each of these shows the shallower tertiary furrows, so that 12 incipient annuli are recognizable. A similar condition is commonly present on IX but on the specimen drawn, one of the secondary annuli, apparently *b4,* is more completely divided; X and XI again are each reduced to the 3 primary annuli which are enlarged but show the secondary furrows only faintly or not at all; XII also is similar but on some specimens *a1* and *a2* are more closely united, reducing this practically to a biannulate condition (Fig. 3). Beginning with somite XIII and continuing to XXIII inclusive, the tertiary annuli are fully developed and dominate the annulation, the furrows being little or no shallower than the primary and secondary furrows. There are, however, some variations. The first two annuli (*c1* and *c2*) are often larger than the others, as shown on Fig. 1 for somite XV, or they may be completely divided into the 4 quaternary annuli *d1* to *d4* (XIV and XVI) or only one of these or more rarely some other tertiary annulus (XIX) may be bisected. The result is that the complete somites of the middle body region are divided into 12, 13 or 14 narrow annuli. In part, this variation may be due to the condition of the specimen, its state of preservation, irregular contraction, distortion, etc. When greatly distended with blood the furrows may be completely smoothed out, in which case the annuli can be determined only by counting the number of circular muscle bands. There is also some uncertainty about the exact somite limits, as to whether a particular annulus falls to a preceding or a succeeding somite. This may be the case with XIII, which as figured has only 11 annuli but it may be that, as in many leeches, XIII contributes to the clitellum and that the annulus indicated as XII *a3*, in whole or part belongs to XIII. At the caudal end reduction begins with somite XXIV and follows the order shown in Fig. 1 but here again, owing to the absence of good segmental criteria, there is much uncertainty in delimiting the somites.

Lacunar System.—The coelomic sinuses are greatly reduced by extension of the parenchyma. Lateral vesicles, dorsal and lateral canals and true segmental annular canals are absent, thus conforming to Selensky's Type II, subtype C. The ventral longitudinal canal is well developed and encloses the nerve cord for its entire length. In the pharyngeal and again in the anal region it is more extensively developed to surround the local portions of the alimentary canal. Ovarian and testicular sinuses are fully developed and each of the 5 pairs of the latter has a dorsal extension which tapers to a blind end by the side of the crop-stomach.

Digestive System.—The general features are shown in Figure 1. The mouth (*m*) is a minute pore on the ventral face of the cephalic sucker in somite III or between III and IV. From the mouth runs a tubular peripharyngeal chamber bounded by a delicate membrane surrounding the proboscis and connected with its base in somite IX. It passes through the brain ring and enters the ventral sinus canal with the nerve cord. The pharynx (*p*) is a freely exsertile proboscis, lying in the peripharyngeal chamber and attached at its base in IX by retractor muscles which run obliquely to the body wall in X. It has the typical rhynchobdellid structure, being a slender hollow muscular cone. The small lumen is triangular and the thick walls are divided by the radial muscle strands more or less regularly into 8 narrow longitudinal compartments containing blood vessels and the ducts of oesophageal gland cells. The oesophageal or salivary glands (*og*) are about 12 or 14 very large spherical cells, measuring up to about 200 μ or approximately the maximum diameter of the proboscis. These are disposed somewhat in symmetrical pairs in somites IX and X by the sides of the peripharyngeal chamber and the oesophagus. From other unicellular glands in this region they are readily distinguished not only by their large size but by the uniformly pale red stain of the finely granular flocculent cytoplasm and the deep solid blue of the nucleus. The similarly stained ducts may be traced to the place of junction of the oesophagus with the base of the proboscis and through the longitudinal spaces of the latter to its free end. The oesophagus (*oe*) is a generally narrow tube, somewhat variable both in diameter and thickness of wall, which extends from the base of the proboscis in IX to the stomach-crop in XIII and lies dorsad of the atrium between the cornua and among the prostate glands. Its caudal end may be enlarged and may contain a light flocculent material which has much the appearance of the residue of digestion in the intestine. In somite X, close to the cephalic face of the atrium and the prostate glands is a pair of widely divergent oesophageal pouches (*op*), serially homologous with the gastric caeca. When distended they are ovate or ellipsoidal sacs with the lining epithelium folded into thin longitudinal ridges and their narrow straight ducts opening into the oesophagus. In two specimens they are empty and collapsed and the walls irregularly folded. Their function is unknown but they do not appear to be glandular. The stomach (*sc*) or stomach crop, serving for the storage of blood, and by far the largest part of the digestive system, occupies somites XIV to XX and with the caecum reaching to

XXVI. It is divided into 6 segmental chambers by intersegmental constrictions with wide passages at XIV/XV to XIX/XX. The thin walls adapt themselves to the blood content so that the chambers vary greatly in size and form, being generally rhomboidal when partly filled but when fully engorged becoming greatly distended between the successive pairs of testes, and slightly lobulated at the margins. At the intersegmental constriction dorso-ventral muscles may contract the openings and at XIII/XIV a definite sphincter may completely separate the stomach and oesophagus. In somite XX the stomach-crop gives rise to the massive caudal caecum and passes into the digestive stomach and intestine. The caecum (*uc*) reaches into XXVI, nearly or quite to the anus and is divided by intersegmental septa, including a pair of dorso-ventral muscle sheets, into 4 or 5 block-like segments and a smaller terminal one, with the margins of the larger ones, at least, divided into usually 4 short lobes. Although derived by the fusion of the last pair of gastric caeca of most leeches it shows no trace of its dual origin except an occasional slight bilobation of the caudal end and in one case delicate strands of parenchymatous tissue which pass through the caecum dorso-ventrally behind the levels of ganglia XXI and XXIII. These are thought to be traces of the fenestrae which in many Piscicolidae are places of incomplete coalescence of the two caeca, but in no other specimen of *Myzobdella lugubris*, either of those dissected or sectioned (8 in all), were they found. The digestive stomach (*ds*) is connected with the stomach-crop by a short median dorsal sphincter tube. It is a small thick-walled chamber with a pair of rounded, forwardly directed lobes arising from the point of its continuation into the intestine. The intestine (*in*) is a generally narrow, thin-walled tube but varies irregularly in both respects as it bends from side to side over the dorsum of the caecum. There are no intestinal caeca, unless the pair connected with the digestive stomach should be so considered, and only very slight intersegmental constrictions which have no significance except the one at XXIII/XXIV, marking the beginning of the somewhat expanded rectum which soon tapers to almost capillary narrowness and ends at the anus.

Reproductive Organs (Figs. 1-3).—The external features of the clitellar region are described above; the internal organs are much simpler than in many genera. The testes (*t1-t5*), each enclosed in a testicular sinus, are 5 pairs situated intersegmentally alternately with the gastric chambers at XIV/XV to XVIII/XIX inclusive and extending well into the contiguous somites. Normally spheroidal, they are modified in shape by the pressure of the blood-filled stomach and degrees of contraction and extension of the body. The vas deferens (*vd*) continues forward as a very delicate capillary duct to somite XIII, where it gradually increases to several times its original diameter, bends toward the meson in close proximity to its fellow of the opposite side and forms several open loops in XII and XI to constitute a simple epididymis or spermatic vesicle (*ep*). Continuing to increase in diameter, it becomes the large, strongly curved sperm sac or ejaculatory bulb (*sv, ss*) which arches high on the side and then, tapering into the ejaculatory duct (*ed*), curves ventrad and mesad to become the atrial cornus and joins its fellow in the atrium (*at*). The terminal male organ or atrium (Figs. 2, 3) is small and deeply divided into the atrial cornua (*atc*), and its walls are thick and solid, the anterior consisting almost entirely of the ducts of the numerous prostate gland cells and the posterior of very high and narrow columnar epithelial cells, which greatly reduce the unpaired cavity. Prostate gland cells (*pg*) are numerous and form a thick layer (probably including some parenchyme cells) over the dorsum and upper anterior face of the atrium, its cornua and much of the ejaculatory ducts and bulbs. The cells measure about 32 to 35 μ, are densely granular and deep staining and their ducts open into the cornua and in large numbers into the dorsal part of the cephalic wall of the atrium. Below the prostate and in front of the atrium is a second gland (*pga*) consisting of a loose aggregation of upwards of 40 cells averaging nearly twice the diameter (53 to 62 μ) of the prostates. They also differ in the more pyriform shape, the cytoplasm reticular and much lighter stained, and the longer ducts which enter as a group the lower part of the cephalic face of the atrium and probably discharge into the bursa into which the atrium opens. The bursa (*b*) is a small irregular chamber covered by two layers of muscle and lined by a thin folded epithelium. It is capable of eversion through the male pore in which case the end of the atrium may project as a blunt cone with its orifice at the apex. The ovaries (*ov*) are contained in a pair of simple, more or less clavate sacs which, as they mature and become filled with ova in various stages of development, become much enlarged and more or less folded, largely filling somites XII and XIII. No cases were seen in which they extended beyond XIV. Anteriorly they taper into narrow ducts which finally meet beneath ganglion XII and unite in a very short, narrow vagina (*v*) or common oviduct ending at the female pore. Clitellar or cocoon glands (*cl*) are very numerous and conspicuous throughout the post-clitellar region from somites XIII to XXV inclusive, forming a layer between the gut and the body wall along with parenchymal cells and the large skin mucous gland cells. They are 2 or 3 times the diameter of the prostate cells, densely and coarsely granular and deep-staining or clear and nearly homogeneous with large vacuoles and their long ducts are gathered into longitudinal bundles which finally unite at the clitellum into a very large ventral pair and 2 or 4 smaller dorsal groups. A few of these cells occur also in the pre-clitellar region.

The preserved material was not suitable for a detailed study of the vascular system but such blood vessels as were noticed agreed with related leeches. The body walls, while having the customary epithelium, with glandular, sensory and covering cells, and circular, oblique and longitudinal muscle layers, the fibers of the latter being larger, are pigmentless, thin and transparent, especially when the stomach and caeca are distended. The clitellar and other unicellular glands are then very conspicuous, indeed probably the most conspicuous external characteristic. The dark green color described by Leidy is due chiefly to the dark opaque blood in the gut and the clitellar glands showing through the transparent skin.

A few egg-capsules or cocoons collected by Dr. Meyer are helmet-shaped domes of elliptical outline with a flat base having a thin rim for attachment and at each end small circular sealed orifices. They exactly resemble Selensky's figure of those of *Crangonobdella.* Several measured are .6 to .75 mm. long and .35 to .5 mm. wide. They are attached to the shell and setae of the host.

The Piscicolidae, of which *Myzobdella* is a member, is the least known of the families of leeches. This is due chiefly to the fact that most of the species are marine and that many are small and inconspicuous and externally little distinctive; also they are difficult to properly prepare and study. Of all leeches they are the most strictly aquatic, as well as the most truly parasitic on both fresh-water and marine fishes and less often on crustaceans and mollusks.

The more than sixty nominal genera that have been proposed have been reduced by at least one-half by synonymy and preoccupation. Of those generally accepted, the anatomy of less than one-half is well known. In addition it is obvious that not only many species but many genera of marine leeches remain to be discovered. It is clear, therefore, that any grouping of the known genera must be tentative. Several attempts to subdivide the family have been made but have proved unsatisfactory. Recognition of subfamilies or other supergeneric groups can best be deferred until our knowledge of genera is more nearly complete.

Myzobdella is to be associated with that group of genera, which includes, among others, *Abranchus, Hemibdella, Ottonia, Illinobdella* and *Crangonobdella,* with the two regions of the body (trachelosome and urosome) not sharply differentiated and without lateral pulsatile vesicles or other special respiratory appendages. From most genera of this group *Myzobdella* is readily distinguished by the number of annuli per somite, the structure of the reproductive organs, the degree of development of the lacunar system and the extent of fusion of the last pair of gastric caeca.

Comparison with *Illinobdella* Meyer and *Crangonobdella* Selensky reveals a close resemblance. With the latter, *Myzobdella* possesses in common the following characteristics: general form with the trachelosome passing gradually into the urosome without a preputial fold or collar; suckers smaller than maximum body width with eyes on the head and central position of mouth; extent of the clitellum, position of the gonopores and the presence behind the female gonopore of an elliptical thickening of the ventral hypodermis to form a copulatory area; total absence of pulsatile vesicles; general annulation, with all 12 tertiary annuli and sometimes two or four quaternary annuli developed on complete somites; general form of alimentary canal with narrow oesophagus provided with a pair of saccular diverticula in somite X, stomach-crop with six simple chambers alternating with the testes, the caudal pair of caeca completely united into a single massive one and an irregularly chambered dorsal intestine beginning in XX as a bilobed digestive stomach; greatly reduced system of lacunae, the lateral, dorsal and connecting annular canals being absent in both genera; reproductive organs simple, the male with five pairs of testes, the seminal vesicles only a few open folds, the ejaculatory bulb or sperm sac little enlarged and the ejaculatory ducts or atrial cornua separated almost to the bottom of the atrium which is small, highly glandular, and opens by a small pore into the folded eversible bursa, prostate or atrial glands highly developed and covering most of the atrium, its cornu and part of the ejaculatory bulb; female organs simple, elongated ovarian sacs which unite in a minute vargina, no ovarian sperm duct; clitellar or cocoon glands greatly developed.

The differences between these two genera are mostly external and while conspicuous are relatively unimportant. In *Myzobdella* the body wall is translucent and unpigmented and there is only one pair of eyes on the cephalic sucker and no eye-spots elsewhere. *Grangonobdella* is heavily pigmented in a definite metameric pattern, has two pairs of cephalic eyes, a pair of nuchal eyes, a circle of eye-spots on the caudal sucker and conspicuous eye-spots on the neural annuli of all body somites; also both suckers are somewhat larger. Internally the conjoined posterior pair of gastric caeca are perforated by a series of five minute median fenestrae which appear to be totally lacking in *Myzobdella* except for possible traces of two in one series of sections. The clitellar glands which in *Crangonobdella* extend only to somite XVII are found in *Myzobdella* as far caudad as XXV and are very conspicuous, in this respect resembling *Platybdella.* A special group of atrial cells, much larger and otherwise differing from the ordinary prostate cells, which occur in *Myzobdella* are not mentioned by Selensky for *Crangonobdella.* Each of the genera is now known by a single species living on a crustacean host. The differences between the two as listed seem to be no more than specific and the discovery of additional species and further research on the morphology of those now known seems likely to confirm *Crangonobdella* Selensky as a synonym of *Myzobdella* Leidy.

With *Illinobdella* Meyer the resemblance of *Myzobdella* is even closer. Externally the resemblance is complete except that no integumental thickening to form a copulatory area has been described for any of the four species recognized by Meyer. Especially to be noted are the small suckers, the absence of eye-spots and reduction of the cephalic eyes to one pair, the absence of skin pigment and the translucence of the integuments. Internally, so far as the anatomy is known, *Illinobdella* agrees with the other two genera, the variations which Meyer figures in the alimentary canal, sperm ducts, etc., having no generic significance. The resemblance to *Myzobdella* is even closer in the following respects: further extension of the clitellar glands caudad, complete occlusion of the caecal fenestrae and the very large size of the oesophageal or salivary glands. The presence of the paired oesophageal pouches in somite X of *Illinobdella moorei* Meyer is now reported for the first time but it is not known whether this genus possesses two kinds of atrial glands nor has the lacunar system of any species been worked out. *Illinobdella* is an American genus to which Meyer refers four species of fish parasites found in fresh and brackish waters and there is little doubt of its generic identity with Leidy's *Myzobdella*. A final decision awaits especially a study of its lacunar system. *Carcinobdella* Oka, with two Japanese species parasitic on crabs and fishes, is another synonymical suspect but nothing is known of its internal anatomy.

Bibliography

Autrum, H. 1939. Hirudineen in Bronn's Tierreichs, 4, Teil 2, Leipzig.

Leidy, J. 1852. Proc. Acad. Nat. Sci., Phila., 1851-3, p. 243, *Myzobdella*.

Meyer, M. 1940. Trans. Amer. Micr. Soc., 59, 354-376. *Illinobdella*.

————. 1941. Journ. Parasitology, 27, p. 290. Body region terminology.

Moore, J. P. 1912. Geol. and Nat. Hist. Survey of Minnesota Zool. Ser., 5, p. 103, pl. III, figs. 21, 22. *Illinobdella* as *Piscicola* partim.

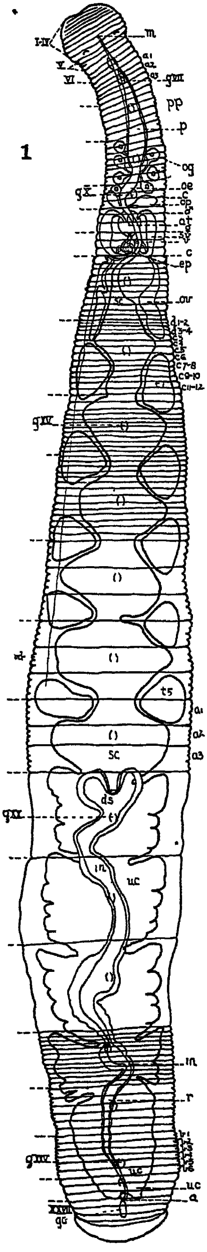
Oka, A. 1927. Proc. Imp. Acad. Tokyo, 3, 171-174 *Carcinobdella*.

Selensky, W. 1923. Zoologische Jahrb. (Abt. Sys), 46, 397-488. *Crangonobdella*.

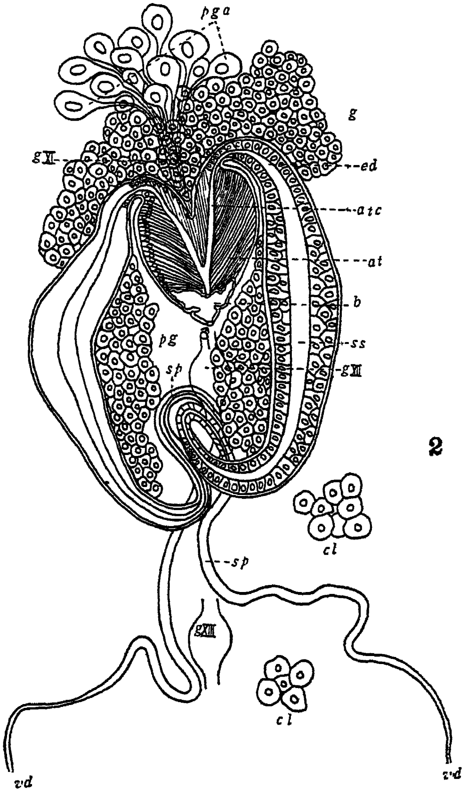
————. 1931. Pubblicazioni Stazione Zool. Napoli, 11, 1-21. *Hemibdella*, lacunar systems.

Verrill, A. E. 1874. Report U. S. Fish Comm., 1871, 645.

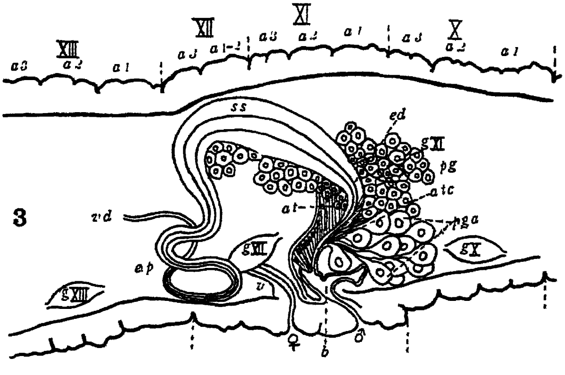
1



2



3



Legend on page 12.

FIG. 1. General dorsal view of external morphology, alimentary canal, reproductive organs and nerve ganglia, based on an entire mounted specimen from Beaufort. × 11 Roman numerals indicate somite numbers and when preceded by *g* the corresponding ganglia; somite boundaries shown by broken lines. Complete annulation for somites I to XVI and XXIII to XXVII inclusive and partially shown for XVII to XIX; annuli symbols on right side at somites VII, XIV, XIX and XXV, *a1-a3* primary, *b1-b6* secondary, *c1-c12* tertiary and *d1-d4* quaternary annuli. *a*-anus, *at*-atrium, *ds*-digestive stomach, *ep*-epididymis, *g*-ganglia of ventral chain, *gc*-caudal ganglion complex, *in*-intestine, *m*-mouth, *oe*-oesophagus, *og*-oesophageal glands, *op*-oesophageal pouches, *ov*-ovarian sacs, *p*-proboscis, *pp*-peripharyngeal chamber, *r*-rectum, *sc*-stomach crop, *sv*-sperm sac or ejaculatory bulb, *t1-t5*-testes sacs, *uc*-united caudal caeca, *vd*-vas deferens, ♂-furrow of male gonopore, ♀-of female gonopore.

FIG. 2. Atrium and associated parts based on a whole mount of a Beaufort example, with cellular details added from sections of a Chesapeake Bay specimen. Optical section of a dorsal view; left side of atrium shows appearance of dorso-caudal wall, right side of ventro-cephalic wall. × 50. Lettering additional to Fig. 1, *atc*-atrial cornu, *b*-bursa, *cl*-clittellar glands, *ed*-ejaculatory duct, *sp*-spermatic vesicle, *ss*-sperm sac or ejaculatory bulb. *pg*-prostate gland cells (some may be parenchymal cells), *pga*-accessory p.g., ♂-male gonopore.

FIG. 3. Vertical optical section of clitellar region showing same parts as Fig 2 with the addition of the vagina and female pore, ♀. From an entire mount and sections of Chesapeake Bay examples. × 50. Lettering as in Fig. 1 and 2.

NOTULAE NATURAE

NUMBER 185 OF JANUARY 15, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NEW PEMPHILIDINE WASPS, WITH NOTES ON PREVIOUSLY DESCRIBED FORMS: II. (HYMENOPTERA: SPHECIDAE)

BY V. S. L. PATE

Research Associate, Academy of Natural Sciences of Philadelphia

The prefatory remarks to Part I[1] of this series gave the reasons for its presentation, and the reader is referred to this earlier contribution for my introductory remarks.

The present paper is a continuation of the first of these studies; it comprises a discussion of the synonymy of a number of species in the genera *Anacrabro, Lindenius, Euplilis,* and *Lestica,* and presents descriptions of various new species in these genera and *Moniaecera.*

ANACRABRO Packard

This Neogaeic genus has several representatives in North and Middle America. Most Nearctic specimens are referable to the following species.

Anacrabro ocellatus Packard

Anacrabro ocellatus Packard, Proc. Ent. Soc. Phila., VI, p. 67, (1866); [♀; Massachusetts; Illinois].

Anacrabro boerhaviae Cockerell, Canad. Ent., XXVII, p. 308, (1895); [♂; Las Cruces, New Mexico; August 23, 1895; on *Boerhavia* sp. (*B. erecta*?)]. (New synonymy.)

Anacrabro robertsoni Rohwer, Proc. Ent. Soc. Washington, XXII, p. 58, (1920); [♀; Inverness, Florida]. (New synonymy.)

---

[1] Pt. I: Notulae Naturae, no. 171, (March 26, 1946).

The above synonymy is based upon an examination of the types of Packard and Cockerell in the collection of the Academy of Natural Sciences of Philadelphia and of Rohwer in the United States National Museum. Cockerell's *boerhaviae* is a very fully maculated form of *ocellatus* and might be recognized as a colour variety. Rohwer's Floridian *robertsoni* is merely a melanic specimen.

Anacrabro coruleter[2] new species

The closest ally of the present species is the southern Brazilian *cimiciraptor* Williams, but the uniformly punctate pygidial area of the female, the punctate scutellum, the sparsely punctate mesonotum, the structure of the clypeus, and differences in the livery will readily separate *coruleter* from that form.

Type.— ♀ ; Puerto Colombia (Sabanilla), Department of Atlantico, Colombia. July 11-12, 1920. (Rehn & Hebard; dry hills with thick scrub.) [Academy of Natural Sciences of Philadelphia, Type no. 10589.]

Female. Length, 5.5 mm. Black; the following citrinous: mandibles except red apices; antennal scapes; pronotum to and including tubercles; axillae; scutellum; postscutellum; first five abdominal tergites with an elongate, transverse cuneate spot laterally on each side; fore femora at apex and beneath; fore tibiae entirely; middle and hind tibiae on outer faces. Fulvous: all tarsi; tegulae and axillary sclerites. Wings faintly infumated; veins and stigma brunneous.

Head subfulgid; suborbicular in anterior aspect. Clypeus and inner orbits with a dense sericeous silvery pile; temples with a moderate vestiture of decumbent silvery puberulent hair. Eyes with inner orbits arcuate medially, strongly and sinuously divergent above; front shallowly concave, width at narrowest point one-third the vertical eye length, dorsally with a fine, close acupuncturation upon which is superposed a series of scattered, coarse punctures; supra-orbital foveae indistinct, indicated only by an oval impunctate area; postocellar line two and eight-tenths the ocellocular distance; postocellar line bisected by a furrow running back toward occipital carinule which is strong, somewhat flanged, and almost attains hypostomal carinule below; vertex with very coarse, scattered, variolate punctures; posterior orbits margined by a fine carinule; temples finely punctate; temporal carinae well developed; post-temporal and gular regions glabrous, subnitidous. Antennal scapes straight, cylindrical, ecarinate, six-tenths the vertical eye length; pedicel cylindrical, one and two-thirds the length of first flagellar article; flagellum simple, first segment three-fourths the length of second which is subequal in length to third; ultimate article one and three-fourths the length of penult segment; interantennal line twice the length of antennocular distance. Clypeus with median length one-fourth the vertical eye length; clypeal lobe on apical half with a strongly declivent, glabrous, polite, coarsely punctate, trigonal bevel, the median length of which is one-half that of clypeus, the lateral angles with a small tooth, the apical margin truncate and with a narrow flange, the apical width of clypeal lobe two and one-fourth the median clypeal length. Mandibles with apices simple; lower margins gently, arcuately excised. Temporal and mandibular ammochaetae present.

---

[2] From *κόρις*, bug + *ολετήρ*, killer; in allusion to the bug-hunting habits of this genus.

Thorax robust; subfulgid. Pronotum impunctate; anterior dorsal margin sharply carinate, humeri bluntly angulate; tubercles along anterior margin sharply carinate, roundly angulate laterally, the disc with a pellucid fenestra. Mesonotum fulgid, with a few scattered, widely separated, pit-like punctures; axillae flat, oval, lateral edges sharply margined, laterally with a strong hook-like tooth; scutellum with a few scattered, coarse, pit-like punctures; postscutellum impunctate. Mesopleura: prepectus with a few scattered, widely separated, coarse punctures; episternal suture straight, oblique, coarsely foveate; episternum with both fine and coarse punctuation, and a well developed posterior epicnemium. Propodeum:. dorsal face with a transverse row of large areoles; posterior face with a marginate cuneate areole discally, coarsely areolate above and also along the well developed lateral carinae which are bifurcate below; lateral faces finely punctate to indistinctly and horizontally striate.

Fore wing with marginal cell roundly truncate at apex and three times as long as wide; radial vein with second abscissa seven-tenths the length of first abscissa; transverse cubital vein oblique, inclivous, three-fifths the length of second cubital abscissa; cubitus with second abscissa seven-tenths the length of first.

Legs normal for genus. Fore and middle tibiae strongly compressed.

Abdomen moderately constricted between tergites which have an inconspicuous vestiture of puberulent silvery hair. Tergites with coarse, scattered, well separated punctures which become closer and semiconfluent just before the impressed, broad, finely punctate apical flanges. Last tergite with a flat trigonal pygidial area, the lateral margins weakly arcuate, the disc uniformly covered with very coarse, setigerous, well separated punctures. Venter flat, fulgid, impunctate.

This species is known at present from only the unique female described above.

LINDENIUS Lepeletier and Brullé

This Holarctic genus has more than half a dozen representatives in North America. All of the Nearctic forms, however, are referable to the subgenus *Trachelosimus* of Morawitz, which may be differentiated from the nominate complex by the characters given in the following table.

Key to Subgenera

Front simple, unarmed; oral fossa deep, as long as, or longer than broad, extending far back and invading the concave occipital region of head; the hypostomal carinule simple, not lobed or dentate medio-posteriorly; the genapontal distance less than the depth of the oral fossa; occipital carina not terminating ventrally in a tooth; antennal sockets subcontiguous to nearest lower inner orbits; generally larger, Old World forms ....*Lindenius* sensu stricto

Front armed medially above antennal sockets with a spine which is sometimes very small; oral fossa shallow, transverse, broader than deep, not extending back and invading the concave occipital region of head, the hypostomal carinule lobed or dentate medioposteriorly; genapontal distance subequal to, or longer than, depth of oral fossa; occipital carinule often terminating ventrally in a spine or tooth; antennal sockets usually distinctly separated from nearest lower inner orbit; smaller, Holarctic forms *Trachelosimus* A. Morawitz

Lindenius (Trachelosimus) armaticeps (Fox)

Crabro armaticeps Fox, Trans. Amer Ent. Soc., XXII, p. 185, (1895); [♂; Texas].

Crabro flaviclypeus Fox, Trans. Amer. Ent. Soc., XXII, p. 186, (1895); [♀; Colorado; Montana]. (New synonymy.)

Crabro (*Lindenius*) *zellus* Rohwer, Ent. News, XX, p. 151, (1909); [♀; Falls Church, Virginia]. (New synonymy.)

The above synonymy is based on a study of the types of Fox and Rohwer. When Fox described *armaticeps* and *flaviclypeus,* he hazarded the opinion that they might eventually prove to be merely opposite sexes of the same species. From the distributional and other data now at hand, I have no hesitancy in stating this to be true.

Lindenius (Trachelosimus) columbianus columbianus (Kohl)

Crabro (*Lindenius*) *columbianus* Kohl, Ann. k. k. Naturhist. Hofmus. Wien, VII, p. 203, (1892); [♀; Revelstoke, British Columbia].

Crabro pinguis Fox, Trans. Amer. Ent. Soc., XXII, p. 186, (1895); [♀; Washington]. (New synonymy.)

Kohl's *columbianus,* the identity of which has never hitherto been correctly understood, is the commonest and most widely distributed North American *Lindenius.* The species is divisible into at least two distinct subspecies. The nominate race is confined to the Northern Rocky Mountain system and Columbian Plateaux areas of the northwestern United States and British Columbia. I can find no essential difference between *pinguis* and typical *columbianus* and accordingly place Fox's species as a synonym of that subspecies.

Lindenius (Trachelosimus) columbianus errans (Fox)

Crabro errans Fox, Trans. Amer. Ent. Soc., XXII, p. 184, (1895); [♀, ♂; Colorado: [Fort Collins ?; ♀: type locality]. New Mexico: Las Cruces. Illinois: [Carlinville?]. District of Columbia. Pennsylvania.].

Ammoplanus salicis Cockerell, Ann. & Mag. Nat. Hist., (6), XIX, p. 402, (1897); [♀; Las Cruces, New Mexico]. (New synonymy.)

Fox, when he described *errans*, stated that it might be proved to be synonymous with *columbianus*. His name, however, may be retained for the atypical race of *columbianus* which ranges throughout the United States and Canada east of the Rocky Mountains and also throughout the southwestern states. Cockerell's *salicis*, originally allocated to the Pemphredonine genus *Ammoplanus*, is merely a melanic form of *errans* with a somewhat finer type of propodeal sculpture. These are insufficient grounds for retaining *salicis* as a discrete form.

Lindenius (Trachelosimus) tecuya[3] new species

Lindenius columbianus Rohwer, Proc. U. S. Nat. Mus., LIII, p. 241, (1917); [♂, ♀; Santa Barbara, California]. (Not of Kohl, 1892.)

The peculiar conformation of the mesonotum, which is bisected by a deep, rounded furrow on each side of which is a sharp crest, readily differentiates *tecuya* from all other species of *Lindenius*.

Type.—♂; Solomon Canyon, twelve miles southwest of Santa Maria, Santa Barbara County, California. Elevation, 900 feet. August 12, 1937. (V. S. L. Pate; flying over a sand bank.) [Academy of Natural Sciences of Philadelphia, Type no. 10588.]

Male. Length 4.5 mm. Black; the following stramineous: mandibles except red apices; scapes anteriorly; anterior margin of pronotum (interrupted medially); pronotal tubercles; fore and middle tibiae externally; hind tibiae widely annulate at base; all metatarsi. Fulvous: flagellum beneath; four distal segments of all tarsi; fore tibiae beneath. Tegulae and axillary sclerites light brunneous. Wings clear hyaline; veins and stigma brunneous.

Head subfulgid; inner orbits with a broad band, and clypeus with appressed silvery sericeous pile; vertex and temples silvery puberulent. Front broad, gently concave, with a glabrous, impunctate, polite, immarginate scapal sinus; vertex finely punctate; ocellocular line seven-tenths the postocellar distance, a weak furrow running obliquely forward from posterior ocelli to upper inner orbits; temples finely punctate; occipital carina not terminating below in a spine or tubercle. Antennae with scapes subcylindrical, ecarinate, three-fourths the vertical eye length; pedicel subcylindrical, subequal in length to first flagellar article; flagellum simple, second segment four-fifths the length of first, ultimate article twice the length of preceding segment; antennocular distance twice the interantennal line. Clypeus finely punctate, median length three-eighths the vertical eye length; linear laterally, deeply emarginate on each side of the subquadrate median lobe, the disc of which is gently tumid, the apical margin subbevelate, fulgid, impunctate, and the latero-apical corners rectangularly excised. Mandibles with a long acute basal tooth on inner margins.

---

[3] Tecuya or Tokya: the Yokuts name for the Chumash Indians of California.

Thorax subfulgid; with a moderate vestiture of short silvery pubescence; mesonotum and pleura with fine; rather close, even puncturation throughout. Pronotum with anterior dorsal margin bluntly carinate, notched medially, the carina rounded and vertically declivent at humeri, behind which is another short, transverse carinule on each side. Mesonotum bisected by a deep, broad, rounded trough on each side of which the surface is elevated into a sharp longitudinal crest, laterad of which the surface is strongly concave, with a short carina running forward from just above tegulae, and a small elongate tubercle medially on each side; suture between mesonotum and scutellum foveolate; scutellum, finely punctate, immarginate laterally; postscutellum finely punctate. Mesopleura with a sharp epicnemium anteriorly on prepectus; episternal suture vertical, somewhat sinuous, impressed and finely foveate; mesopleural pit large and distinct; hind margin consute; metapleura glabrous, impunctate, polite; mesosternum rounded, immarginate anteriorly. Propodeum with an inconspicuous vestiture of silvery puberulent hair on posterior face; dorsal face with a large, semicircular, weakly delimited enclosure, bisected by a narrow marginate furrow, the lateral areas polite, glabrous, impunctate; posterior face with a more or less immarginate obcuneate fovea discally, the lateral areas finely punctate; lateral carinae well developed, simple below; lateral faces polite, impunctate, with a few fine indistinct, horizontal striae.

Legs simple, normal for genus. Middle and hind tibiae spinulose on outer faces. Longer hind tibial calcar five-eighths the length of hind metatarsi.

Fore wings with marginal cell three and one-half times as long as wide, broadly, obliquely truncate at apex; radius with first abscissa five-ninths (0.55) the length of second abscissa; transverse cubital vein oblique, inclivous, one-half the length of second abscissa of cubitus which is subequal in length to first abscissa of cubitus.

Abdomen perfulgid; with a very thin vestiture of decumbent silvery puberulent hair. Tergites and sternites with fine, well separated, setigerous acupuncturation. Pygidial area subtrigonal with apex truncate, the disc with coarse, scattered, setigerous punctures. Sternites and hypopygium simple, normal.

Allotype.— ♀ ; Santa Barbara Coast, Santa Barbara County, California. July, 1907. (W. M. Giffard.) [United States National Museum.]

Female. Length 4.5 mm. Agrees with the type (male) except in the following features:

Livery the same but scutellum largely yellow.

Head similar but ocellocular line four-fifths the length of postocellar distance. Clypeus with median length nearly three-eighths (0.35) the vertical eye length. Antennal scapes nearly two-thirds (0.65) the vertical eye length; pedicel one and a fourth times the length of first flagellar article which is subequal in length to second segment.

Fore legs with a pecten of short, stiff spines on metatarsi.

Abdomen with an elongate trigonal pygidial area, the disc with scattered, coarse setigerous punctures.

Paratypes.—5 males, 6 females, as follows:

CALIFORNIA: Santa Barbara Coast, Santa Barbara Co.; July, 1907; (W. M. Giffard): 4 ♂, 2 ♀ [U. S. N. M.]. Redlands, San Bernardino Co.; (F. R. Cole): 1 ♀ [U. S. N. M.]. San Bernardino County: 1 ♀ [U. S. N. M.]. Alcalde (west of Coalinga) in Diablo Mountains, Fresno Co.; August 6, 1927: 1 ♀. Four miles west of Mariposa, Mariposa Co.; elevation, 2100 ft.; August 7, 1937; (V. S. L. Pate): 1 ♂, 1 ♀; [A. N. S. P.].

The paratypes agree with the types in all essential features.

EUPLILIS Risso

This cosmopolitan genus has a number of representatives in North and Middle America. The specific identity of many of these has been misunderstood in the past: the following synonymic notes should, however, materially clarify this confusion.

Euplilis (Euplilis) nicaraguaënsis (Cameron)

Rhopalum Nicaraguaense Cameron, Invertebrata Pacifica, I, p. 66, (1904); [♀ San Marcos, Nicaragua].

Rhopalum opacum Rohwer, Proc. U. S. Nat. Mus., XLVII, p. 521, (1911); [♂; Quirigua, Guatemala].

Comparison of the type of *Rhopalum opacum* Rohwer, 1911, with material of *Rhopalum nicaraguaënse* Cameron, 1905, has convinced me that Rohwer's species is a synonym of Cameron's earlier form. This Middle American species has been intercepted at quarantine points in the southern and southwestern states and may eventually become established in the United States.

Euplilis (Corynopus) coarctatus (Scopoli)

Sphex coarctata Scopoli, Entom. Carn., p. 293, no. 778, pl. 42, fig. 778, (1763); [♂; Carniola].

Crabro tibialis Fabricius, Suppl. Entom. Syst., p. 271, no. 27-28, (1798); [Halle, Saxony]. (Not of Olivier, 1791.)

Rhopalum pedicellatum of authors, not of Packard. [*v.* Pate, 1943, Bull. Brooklyn Ent. Soc., XXXVIII, p. 15.]

Rhopalum modestum Rohwer, Ent. News, XIX, p. 257, (1908); [♂, Boulder, Colorado]. (New synonymy.)

In 1943 I stated that Rohwer's *modestum* was probably a synonym of Scopoli's Holarctic *coarctatus*. An examination of the type of *modestum* Rohwer in the collection of the United States National Museum has confirmed my earlier opinion.

Euplilis (Corynopus) pedicellatus (Packard)

Rhopalum pedicellatum Packard, Proc. Ent. Soc. Phila., VI, p. 380, (1867); [♂, ♀; Maine; Massachusetts, Connecticut; New York]. [*Cf*: Pate, 1943, Bull. Brooklyn Ent. Soc., XXXVIII, p. 15.]

Rhopalum rubrocinctum Peckham and Peckham, Wisconsin Geol. & Nat. Hist. Surv., Bull. no. 2, Sci. Ser. no. 1, p. 43, (1895); [♀; Hartland, Waukesha Co., Wisconsin].—Peckham and Peckham, Wasps, Social and Solitary, p. 74, (1905). (New synonymy.)

The Peckhams, in their well known work on the instincts and habits of the solitary wasps, report that ". . . toward the end of August, we found another species of *Rhopalum*, which proved to be new, and for which Mr. Ashmead has proposed the name *rubrocinctum*, since it wears a red girdle around the front end of the abdomen, being otherwise dressed in black like *pedicellatum* . . ." But Ashmead never published a description of this species, nor any other *Rhopalum* from Wisconsin. The name *rubrocinctum* must be attributed to the Peckhams and the above brief remarks constitute the original description of the species. In the collection of the United States National Museum, I recently discovered two females from Hartland, Wisconsin, bearing the label "*Rhopalum rubrocinctum* Ashm." in Ashmead's own hand; these are evidently the specimens sent to him by the Peckhams: they answer their brief description, and probably represent the type series. I have selected one of them as lectotype. However, as indicated above, *rubrocinctum* is a synonym of the true, but much misunderstood, *pedicellatum* of Packard.

Euplilis (Corynopus) arapaho[4] new species

The truncate clypeal lobe, the different conformation and colour pattern of the antennal flagellum, the simple, alobate middle metatarsi, and the more weakly clavate hind tibiae readily differentiate *arapaho* from its closest relative, the Holarctic *coarctatus*.

Type.—♂; Canyon of the Cache Le Poudre River, about twenty miles west of Fort Collins, Larimer County, Colorado. June 13, 1933. (V. S. L. Pate; flying about shrubs at edge of stream.) [Academy of Natural Sciences of Philadelphia, Type no. 10590.]

Male. Length 4 mm. Black; the following stramineous: mandibles except red apices; palpi; scapes; pedicel; pronotal tubercles; fore and middle legs entirely; hind coxae, trochanters, femora with a line beneath, and tibiae and metatarsi both annulate at base. Fulvous: antennal flagellum save for last two segments which are black; last abdominal sternite. Tegulae and axillary sclerites pallid testaceous. Dark badeous: hind femora, tibiae and tarsi exclusive of yellow maculation; first two abdominal segments. Wings clear hyaline; veins and stigma brunneous.

---

[4] After the Arapaho Indians.

Head fulgid; clypeus with a moderate vestiture of appressed, silvery, sericeous hair; remainder of head with a thin clothing of silvery puberulent hair. Front gently concave, with a polite, impunctate, glabrous, immarginate scapal sinus; with a small blunt, declivent tooth between and just above antennal sockets; bisected above by an impression running forward from anterior ocellus; upper front, vertex, and temples with well separated, fine, setigerous acupuncturation; ocelli large, situated in an equilateral triangle, the postocellar line two-thirds the ocellocular distance; occipital carina rather fine. Antennae with scapes obterete, ecarinate, three-sevenths (0.43) the vertical eye length; pedicel subcylindrical, edentate beneath, twice the length of the first flagellar article; flagellum with first segment annulate, four-tenths the length of second, the second and third segments elongate, subequal in length, both emarginate beneath at base and gibbous at apex, remaining segments simple though fourth and fifth rounded out below, the fourth and fifth each two-thirds the length of third, ultimate article twice the length of preceding segment. Clypeus with median length almost three-eighths (0.357) the vertical eye length; median lobe similar to that of *coarctatus* but with apical margin squarely truncate and lateral margins not as strongly revolute as in that species. Mandibles evenly bidentate at apex; inner margins edentate.

Thorax fulgid; with a thin clothing of fine, decumbent, silvery pubescence throughout. Pronotum with anterior margin and humeri rounded, dorsal surface with a transverse furrow. Mesonotum gently arched, with fine, even setigerous puncturation throughout; suture between mesonotum and scutellum impressed, finely foveolate; scutellum and postscutellum simple, finely punctured, the former immarginate laterally. Mesopleura with fine, scattered, setigerous acupuncturation throughout; rounded anteriorly; episternal suture finely foveolate; mesopleural pit small; hind margin simple; metapleura polite, impunctate, glabrous. Propodeum: dorsal face without a distinct enclosure, polite, impunctate, glabrous, bisected by a fine linear marginate sulcus; posterior face with an immarginate, lenticular discal fovea, below which is a Y-shaped carinule; lateral carinae developed along posterior face only; lateral faces glabrous, polite.

Fore wings with marginal cell two and a half times as long as wide, broadly and squarely truncate at apex and with a large trigonal appendiculate cell; radius with first abscissa about one-half (0.47), and third abscissa (the truncation) about two-fifths (0.41), the length of second abscissa; transverse cubital vein perpendicular, four-fifths the length of second abscissa of cubitus which is about seven-tenths (0.715) the length of first cubital abscissa.

Legs relatively simple and normal for genus. Fore legs with metatarsi flattened, laminate, subtranslucent. Hind tibiae moderately clavate. Middle and hind metatarsi simple, cylindrical, the middle pair not lobed at base, the hind pair straight and only slightly compressed; all metatarsi subequal in length to the combined length of four distal tarsal segments. Longer hind tibial calcar five-ninths (0.55) the length of hind metatarsi.

Abdomen normal for genus. Tergites and sternites with a thin clothing of short, decumbent silvery pubescence; imperceptibly punctate; last tergite without a pygidial area but with well separated, distinct, though very fine, setigerous punctures. Hypopygium flat, subquadrate, the apex broadly rounded.

Female. Unknown.

Paratypes.—6 males, as follows:

COLORADO: Boulder, Boulder Co.; April 27, 1907; (S. A. Rohwer; reared from stems of cultivated *Ribes*): 1 ♂. Fort Collins, Larimer Co.; July 10, 1896; (C. F. Baker; no. 2044): 4 ♂; June 1, 1896; (C. F. Baker; no. 2175): 1 ♂. [All U. S. N. M.].

The paratypes agree with the type in all essential details.

In addition to the above material I have seen a male specimen in the C. F. Baker collection in the United States National Museum bearing the notation " Can. 2540 [*i. e.* summer of '97—Toronto—W. G. Dietz] " which I have excluded from the type series because I am not fully satisfied that the locality data are accurate.

Euplilis (Corynopus) rufigaster (Packard)

Rhopalum rufigaster Packard, Proc. Ent. Soc. Phila., VI, p. 382, (1867); [♂, ♀; Illinois].
Rhopalum lucidum Rohwer, Ent. News, XX, p. 324, (1909); [♀; Harrisburg, Penna.]. (New synonymy.)

Examination of the type of *Rhopalum lucidum* Rohwer in the collection of United States National Museum has shown it to be merely a specimen of the common widespread eastern *rufigaster* of Packard.

MONIAECERA Ashmead

This peculiar endemic Nearctic genus has a number of representatives in the southern United States. To these may now be added the following distinctive Arizonan species.

Moniaecera pinal[5] new species

The absence of a supra-antennal spine on the front, the almost impunctate upper front and vertex, the relatively finely punctate thorax, and the edentate lower basal margins of the mandibles differentiate the Arizonan *pinal* from the New Mexican *asperata.*

Type.—♂; Phoenix, Maricopa County, Arizona. Elevation, 1108 feet. April 20. [Academy of Natural Sciences of Philadelphia, Type no. 10591.]

Male. Length 4 mm. Fulgid black, with a strong metallic aeruginous tinge. The following eburneous: mandibles except red apices; palpi; scapes anteriorly; flagellum beneath save last two segments; fore tibiae on outer

---

[5] After the Pinal Coyotero Indians, who formerly inhabited the territory from San Francisco Peak south to the Gila River in Arizona.

faces; middle and hind tibiae annulate at base; all metatarsi and tibial calcaria. Light brunneous: pedicel; flagellum above and last two segments entirely; four distal segments of all tarsi; last abdominal sternite. Tegulae and axillary sclerites badeous. Wings clear hyaline, iridescent; veins and stigma badeous.

Head fulgid; clypeus with an appressed, silvery sericeous pile; remainder of head with a sparse and inconspicuous vestiture of short silvery hair. Front gently concave between inner orbits, impunctate, microscopically aciculate, without a porrect or declivent supra-antennal tooth, bisected by a strong furrow running forward from anterior ocellus, discally with a strong pit; upper front and vertex with a microscopically fine cancellate sculpture upon which is superposed a few scattered setigerous acupunctures, closer in the ocellar triangle and on temples; ocelli large, arranged in a subequilateral triangle, the ocellocular line seven-eighths the postocellar distance; occipital carina distinct, weakly flanged, a complete circle in extent, not tangent below but well separated from apex of hypostomal carinule bordering the oral fossa, the intervening region transversely strigose; lower surface of head without tubercles or callosities. Antennae with scapes cylindrical, ecarinate, slender, about five-ninths (0.56) the vertical eye length; pedicel subcylindrical, subequal in length to second flagellar article; flagellum very slender, simple, first segment one and a sixth the length of second which is subequal in length to third, last article twice the length of penult segment. Clypeus short, median length one-sixth the vertical eye length; linear laterally; deeply emarginate on each side of the subquadrate median lobe, the disc of which is somewhat tumid. Mandibles as customary in genus; lower margins edentate beneath at base.

Thorax fulgid; dorsum with a thin clothing of short, erect, silvery pubescence on dorsum, becoming heavier and more noticeable on pleura. Pronotum with fine cancellate sculpture and fine puncturation; dorsal surface weakly notched medially, impressed posteriorly, anterior dorsal margin bluntly margined medially to transversely carinate laterally, the carinule turning abruptly downward to neck at humeri. Mesonotum with fine cancellate sculpture and irregularly scattered, moderate punctures; suture between mesonotum and scutellum abruptly, deeply impressed and foveolate; scutellum punctured and sculptured like mesonotum; post-scutellum simple, finely punctate. Mesopleura with moderate puncturation throughout; prepectus with a sharp epicnemium anteriorly; episternal suture oblique, deeply impressed; mesopleural pit very distinct; metapleura glabrous, impunctate; mesosternum rounded, immarginate anteriorly. Propodeum: dorsal face with a large semicircular area delimited by a weak foveate groove, bisected by a marginate groove which tapers posteriorly, the lateral areas very finely, obliquely cancellatostriate; posterior face finely subgranular, bisected by a deep immarginate groove; lateral carinae present along posterior face only, but even there obsolescent; lateral faces very finely, longitudinally striate.

Legs simple, normal for genus. All tibiae slender, cylindrical-obterete. All tarsi slender, simple, unmodified. Longer hind tibial calcar five-eighths the length of hind metatarsi.

Fore wings short, not surpassing the middle of abdomen; marginal cell three times as long as wide, broadly and obliquely truncate at apex; radius with first abscissa two-thirds the length of second abscissa; transverse cubital vein one-half the length of second abscissa of cubitus which is one and three-tenths the length of first cubital abscissa.

Abdomen fulgid; with a very sparse and inconspicuous clothing of short silvery hairs; tergites with a very fine, transverse aciculation; sternites impunctate. First segment not appreciably nodose at apex, the remainder of abdomen gradually ampliate toward apex; last tergite without a pygidial area, with distinct, though fine, scattered setigerous punctures. Hypopygium simple, flat, apex entire, rounded.

Female. Unknown.

This vernal Arizonan species is known from only the unique male described above.

NORUMBEGA [6] new subgenus

Thyreopus Packard, Proc. Ent. Soc. Phila., VI, p. 353, (1867). [In part.]

Crabro (10. Group *largior*) Fox, Trans. Amer. Ent. Soc., XXII, p. 161, (1895). [In part.]

Pemphilis (*Pemphilis*) Pate, Amer. Midl. Nat., XXXI, p. 350, (1944). [In part.]

GENOTYPE.—*Thyreopus argus* Packard, 1867 [=*Pemphilis* (*Norumbega*) *argus* (Packard)].

The twelve-segmented antennae of both sexes and the position of the apical calcar on the male fore tibiae distinguish *Norumbega* from all other subgenera of *Pemphilis*.

Diagnostic Features.—General habitus similar to that of *Pemphilis* sensu stricto. Antennae twelve-segmented in both sexes. Mandibles with a small subapical tooth on lower margins in both sexes. Mesopleura with prepectus sharply margined anteriorly; hypersternauli present, well developed and foveate in males; obsolescent in females; without a tubercle or vertical carina before middle coxae. Propodeum with dorsal and posterior faces coarsely areolate. Males: antennal flagellum with first segment short, annular, glabrous and without a tuft of curled hair beneath; second to sixth articles with a large laminate appendix on outer margin; remaining segments simple; fore tibiae with a large shield; apical calcar of fore tibiae situated two-thirds of the way from apex, *i. e.* nearer base than apex, and fore tarsi with a large appendix on last segment as in *Pemphilis* sensu stricto; last abdominal tergite without a pygidial area. Females with a very broad, truncate, subrectangular clypeal lobe; pygidial area broad, flat, trigonal, the disc with longitudinal rugulae.

This peculiar and distinctive group is confined to the Nearctic Region.

---

[6] After the fabulous New England Indian kingdom of Norumbega.

LESTICA Billberg

The genus *Lestica* is a moderate sized complex of very diversified forms. Representatives of it occur in all the major zoogeographic areas with the exceptions of the Australian Region. At least five major subdivisions are recognizable within the genus, and four of these may be accorded subgeneric rank. The subjoined table will serve to differentiate these groups.

Analytical Conspectus

* TERRICOLOUS FORMS: Both sexes with mandibular apices bifid. Antennal scapes ecarinate. Females with a flat, coarsely punctate, trigonal pygidial area, the lateral margins incurved somewhat but not furnished with fringes of setae. (Old World forms.)

1. Males with head not prolonged posteriorly nor constricted behind the eyes which reach to the bases of the mandibles. Ocelli arranged in an isosceles triangle. Females with inner mandibular margins edentate .... *Lestica* Billberg

a. Males with fore tarsi patellate, scutate, or distorted; middle metatarsi more or less distorted; ocelli arranged in a high isosceles triangle
Section *Ceratocolus* Lepeletier & Brullé

aa. Males with fore and middle tarsi simple, unmodified; ocelli arranged in a low isosceles triangle or curved line .... Section *Lestica* Billberg

2. Males with head prolonged posteriorly and strongly constricted behind the eyes which do not reach to the bases of the mandibles. Ocelli arranged in an equilateral triangle. Females with inner mandibular margins more or less dentate. [Type: *Crabro* (*Thyreus*) *Pluschtschevskyi* F. Morawitz, 1891 = *Lestica* (*Ptyx*) *pluschtschevskyi* (F. Morawitz)] .... *Ptyx* new subgenus

** LIGNICOLOUS FORMS: Mandibular apices of males bifid, of females tridentate. Antennal scapes of females unicarinate lengthwise. Females with pygidial area strongly narrowed and excavate apically, the lateral margins fringed with stiff setae.

3. Males with head normal, not lengthened nor constricted behind the eyes; ocelli arranged in a low isosceles triangle or curved line; occipital carina attaining the hypostomal carinule. Females generally with abdomen more or less strongly constricted between the segments. (Widespread) .... *Solenius* Lepeletier & Brullé

4. Males with head lengthened and constricted behind the eyes; ocelli arranged in an equilateral triangle; occipital carina not attaining the hypostomal carinule. Females without appreciable constriction between the abdominal segments. (Old World forms.) .... *Clypeocrabro* Richards

All the New World species of *Lestica* are referable to the subgenus *Solenius* which has several representatives in Nearctic America. The commonest of these is *interrupta* which ranges from coast to coast and breaks up into two distinct geographic races.

Lestica (Solenius) interrupta interrupta (Lepeletier & Brullé)

Solenius interruptus Lepeletier & Brullé, Ann. Soc. Ent. France, III, p. 715, (1835); [♀; Philadelphia].

Crabro confluentus Say, Boston Journ. Nat. Hist., I, (4), p. 376, (May, 1837); [♀, ♂; Indiana (New Harmony ?)].

Crabro dubius F. Smith, Catal. Hymen. Brit. Mus., IV, p. 417, (1856); [new name for *Solenius interruptus* L. et B.].

C[*rabro*] *confluens* Leconte, Insects of North America (Thos. Say), II, p. 758, (1859); [emendation for *Crabro confluentus* Say, 1837]. (New synonymy.)

The typical subspecies of *interrupta* ranges from the Atlantic coast westward to the High Plains east of the Rocky Mountains.

Lestica (Solenius) interrupta bella (Cresson)

Crabro bellus Cresson, Proc. Ent. Soc. Phila., IV, p. 481, (1865); [♀; mountain region, Colorado Territory; summer, 1864; James Ridings].

Crabro atrifrons Cresson, Proc. Ent. Soc. Phila., IV, p. 483, (1865); [♂; mountain region, Colorado Territory; summer, 1864; James Ridings].

Crabro opwana Rohwer, Ent. News, XIX, p. 248, (1908); [♂; Florissant, Colorado; 8,000 ft.; July 7, 1907; at flowers of *Heracleum lanatum*]. (New synonymy.)

Crabro (Solenius) townsendi Rohwer, Proc. U. S. Nat. Mus., XL, p. 563, (1911); [♀; Meadow Valley, [head of Rio Piedras Verdes (six miles south of Colonia Garcia), Sierra Madre, western Chihuahua] Mexico]. (New synonymy.)

Hitherto *bella* has been considered to be a distinct species and has frequently been recorded from the eastern United States. But true *bella* is at best merely racially distinct from typical *interrupta* and ranges from the Rocky Mountain region westward to the Pacific coast.

The above synonymy is based upon a study of the types of Cresson in the Academy of Natural Sciences of Philadelphia and those of Rohwer in the United States National Museum.

NOTULAE NATURAE

NUMBER 186 OF FEBRUARY 14, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

ON THE GENERA AUTOMOLUS (FURNARIIDAE) AND MYRMECIZA (FORMICARIIDAE) IN COLOMBIA

BY RODOLPHE MEYER DE SCHAUENSEE

Curator of Birds, The Academy of Natural Sciences of Philadelphia

Recently Brother Nicéforo María of Bogotá forwarded to me for identification some specimens from Colombia. As usual with his collections, this one contained birds of special interest. Several were new to the avifauna of Colombia and two were new to science. The latter are described in this paper.

A Review of *Automolus rubiginosus* in Colombia

Among the birds forwarded is a specimen of *Automolus rubiginosus* from Villavicencio which differs radically from specimens of that species from La Morelia which heretofore have been called *cinnamomeigula* Hellmayr described from Bogotá.

As it was important to settle the question of which of the two types, that from Villavicencio or that from La Morelia, was actually referable to *cinnamomeigula,* I sent a bird from each locality to Mr. John T. Zimmer to be compared with Hellmayr's type which is now in New York. Mr. Zimmer very kindly did this for me and found the Villavicencio bird to be true *cinnamomeigula,* which leaves the Caquetá birds without a name.

Automolus rubiginosus caquetae new subspecies

TYPE.—♂ ad., A.N.S.P. no. 151330, collected at La Morelia (900 ft.), Caquetá, southeastern Colombia by Kjell von Sneidern on October 25, 1941.

Description.—Closest to *Automolus rubiginosus moderatus* Zimmer of northern Perú (south of the Marañón) but dorsal surface paler and somewhat more rufescent; feathers of chin and upper throat not fringed with black; chestnut of throat continued down farther over the breast; belly and flanks warmer, less olive in tone; ear coverts paler, with a silvery tone, instead of dark brown; rufous line extending behind the eye and enclosing the ear coverts absent or ill marked, instead of deep in color and well marked.

Differs from *Automolus rubiginosus brunnescens* Berlioz of eastern Ecuador by having the dorsal surface less deep in color; the belly and flanks much less rufescent and the chestnut of the throat and breast paler, and on the latter, less extensive.

Differs at a glance from *Automolus rubiginosus cinnamomeigula* Hellmayr by the color of the under surface. *Cinnamomeigula* has the chin, throat, breast and flanks, and under tail-coverts solid cinnamon, the center of the belly cinnamon-buff, instead of chin and upper throat whitish tinged hazel and deepening on the lower throat and upper breast to chestnut, lower breast and center of belly buffy brown, flanks much darker, and under tail-coverts rufous-brown.

In addition *caquetae* is a smaller bird. The wing of the male from Villavicencio measures 92 mm., the culmen 22 mm., as against 84, 84, 86 mm., and culmens of 19.5, 19.5 and 20 mm. for three males from La Morelia.

Measurements of type.—Wing 84, tail 78, culmen 19.5 mm.

Range.—Southeastern Colombia in the Caquetá region.

Also included in Brother Nicéforo María's collection is another specimen of *Automolus rubiginosus* from the Magdalena Valley, a region from which the species has not been reported before. It is a most interesting bird in that it bridges the gap between the black-tailed forms and this species (*nigricauda* and *saturatus*) and those with a rufous tail. From its geographical position this is not unexpected. Although I have but a single specimen, its characters are so distinctive that I have no hesitation in describing it.

Automolus rubiginosus sasaimae new subspecies

TYPE.—♀ ad., no. 49, collection of Brother Nicéforo María, Instituto de la Salle, Bogotá, collected at Sasaima, 74 kilometers west of Bogotá, in the Magdalena Valley, by Brother Nicéforo María on August 8, 1945.

Description.—Similar in general color pattern to *Automolus rubiginosus nigricauda* Hartert but tail rufous instead of black. Differs from both that species and *Automolus rubiginosus saturatus* Chapman, which are very close, by rufous instead of bay chin, throat and upper breast, belly and flanks very much paler brown; crown and nape rufous, darker than the throat, instead of bay; back brown, with an olive tinge, instead of deep brown; upper wing-coverts and edges to primaries dull rufous instead of deep brown; tail rufous instead of black.

Differs from *Automolus rubiginosus cinnamomeigula* Hellmayr, from the opposite side of the Eastern Andes, by having the crown and nape rufous instead of olive-brown; the back somewhat paler and more olivaceous; the chin, throat and upper breast rufous instead of dark cinnamon; the lower breast, belly and flanks olive-brown, instead of lower breast and flanks dark cinnamon, belly cinnamon buff.

Differs from *Automolus rubiginosus rufipectus* Bangs, of the Santa Marta region, by having the crown and nape rufous in contrast to the back instead of the same color; dorsal surface much darker and more olive; rufous of throat and upper breast in sharp contract to the olive brown of the lower breast, instead of rufous with little contrast to the rest of the under parts, which are rufous-brown.

Measurements of type.—Wing 85, tail 70, culmen 21 mm.

Range.—Tropical Zone of the middle Magdalena Valley. Known only from the eastern side.

Remarks.—The forms of *Automolus rubiginosus* found in Colombia, and their ranges are as follows:

Automolus rubiginosus saturatus Chapman. Tropical Zone of northwestern Colombia (Alto Bonito).

Automolus rubiginosus nigricauda Hartert. Tropical Zone of western Colombia from the upper Atrato southward.

Automolus rubiginosus sasaimae de Schauensee. Tropical Zone of the middle Magdalena (Sasaima). No form of *A. rubiginosus* is yet known from the Valley of the Cauca River. Strangely this form bears a strong resemblance to the geographically distant *A. r. watkinsi* of southern Peru and northern Bolivia. It is instantly separable, however. by the color of the back, belly and flanks, which is darker and more olive.

Automolus rubiginosus rufipectus Bangs. Tropical and Subtropical Zones of the Santa Marta region.

Automolus rubiginosus cinnamomeigula Hellmayr. Tropical Zone at the eastern base of the Eastern Andes (Villavicencio). This form resembles very closely the geographically far removed *Automolus rubiginosus guerrerensis* Salvin and Godman of southern Mexico.

Automolus rubiginosus caquetae de Schauensee. Tropical Zone of the Caquetá region (La Morelia).

Specimens examined.—*A. r. guerrerensis,* Mexico: o, Orizaba.

A. r. saturatus, Panama: 3 ♂, 4 ♀, Tacarcuna, Darien. Colombia: 2 ♂, o, Alto Bonito.[1]

A. r. nigricauda, Colombia: ♂, Alto del Buey; ♂, Santa Cecilia; ♂, Rio Mechengue; ♂, La Costa.

A. r. rufipectus, Colombia: 2 ♂, Chírua; ♀, Pueblo Viejo, Santa Marta region.

A. r. sasaimae, Colombia: ♀ (type), Sasaima,[2] Magdalena Valley.

A. r. cinnamomeigula, Colombia: ♂, Villavicencio,[2] eastern base of the Eastern Andes.

A. r. caquetae, Colombia: ♂, type, ♂, La Morelia; ♂, 2 ♀, La Morelia,[1] Caquetá.

A. r. brunnescens, Ecuador; ♀, Rio Tigre; ♂, Rio Suno, above Avila;[1] ♀, San Lorenzo abajo;[1] ♂, ♀, Rio Suno abajo;[1] ♂, ♀, mouth of the Rio Curaray.[1]

A. r. moderatus, Peru: ♀ (type), Rio Seco, about 30 miles west of Moyobamba.[1]

A. r. watkinsi, Peru: ♂, La Pampa, Sandia. Bolivia: ♂ Chiñiri, Rio Kaka.

This not very well known form is very different from *moderatus.* The crown and nape are rufous in sharp contrast to the mantle; the dorsal surface is paler and more rufescent, and the rufous of the throat encroaching farther onto the chest.

Myrmeciza atrothorax in Colombia

Hitherto *Myrmeciza atrothorax* has been known in Colombia only from " Bogotá collections ". Brother Nicéforo María has, however, succeeded in collecting a pair, the male at Quenane, Llanos de Meta and the female at Villavicencio, thus securing the first birds in Colombia with actual localities.

This pair represents a new subspecies which differs in several respects from any known form.

Myrmeciza atrothorax metae new subspecies

TYPE.—♂ ad., A.N.S.P. no. 159115, collected at Quenane, Llanos de Meta, Colombia, by Brother Nicéforo María on March 27, 1946.

Description.—Closest to *Myrmeciza atrothorax atrothorax* (Boddaert) of Cayenne but differing by having the black on the breast more restricted reaching only to the extreme upper breast, the feathers of the lower breast black, fringed grey, giving a spotted appearance, instead of solid black. Wing slightly longer.

Measurements of type.—Wing 63, tail 53, culmen 15 mm.

Range.—Tropical Zone east of the Eastern Andes. Villavicencio and the Llanos de Meta.

---

[1] Specimen belonging to the American Museum of Natural History, New York.

[2] Specimen belonging to the Instituto de la Salle, Bogotá, Colombia.

Additional specimen examined.—A female from Villavicencio (Instituto de la Salle, Bogotá, no. 61) differs from females of *atrothorax* by having the throat pure white, not tinged rufous, the rufous of the lower surface paler, and the dorsal surface considerably more olivaceous.

Comparative wing measurements.—M. a. atrothorax, ♂ ♂, 56.5, 57, 57, 57.5, 57.5, 59, 59; ♀ ♀, 56, 56, 59, 60. 60. *M. a. metae,* ♂ 62.5, ♀ 63.

Material examined.—M. a. atrothorax, French Guiana: 3 ♂, ♀, Cayenne; ♂, Tamanoir.[1] Brazil: ♂, ♀, San Gabriel, Rio Negro; ♂, Faro;[1] ♂, 2 ♀, Hacienda Rio Negro, Manáos;[1] ♀, Campo Salles, Manáos.[1]

M. a. tenebrosa, Peru: ♂, Puerto Indiana.[1]

M. a. obscurata, Peru: ♂, 2 ♀, Lagarto,[1] upper Ucayali River.

M. a. melanura, Bolivia: 2 ♂, ♀, Susi, Rio Beni; ♀, ♀ (type of *M. a. griseiventris* Carriker), Chatarona; 2 ♂, ♀, Chiñiri; 5 ♂, 2 ♀, Todos Santos, Rio Chapare; 4 ♂, 5 ♀, mouth of the Rio Chapare; 2 ♀, Buena Vista, Santa Cruz.

Remarks.—I have seen no specimens of *M. a. melanurus* from Matto Grosso, however I still fail to recognize any difference between birds from the Beni district and those from Cochabamba and Santa Cruz in spite of Gyldenstolpe's assertion that *griseiventris* is certainly recognizable (Kungl. Sven. Vet. Handl., 23, no. 1, p. 178, 1945).

I wish here to express my gratitude to Mr. John T. Zimmer of the American Museum of Natural History for being so kind as to lend me material without which this study would have been impossible. Also I express my thanks to Brother Nicéforo María, who has kindly presented the type of the new *Myrmeciza* to this Museum.

NOTULAE NATURAE

NUMBER 187 OF FEBRUARY 21, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NEW TAXONOMIC NAMES OF FISH-LIKE VERTEBRATES

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

While engaged in the preparation of a comprehensive work on the arrangement and classification of the more primitive and generalized fish-like vertebrates, a number of taxonomic problems have been encountered. Some of these call for emended names and others require the proposal of new names. These requirements emanate chiefly from the results obtained from a study of the fishes represented in the celebrated collection of vertebrate skeletons gathered upward of a century ago by the distinguished anatomist Dr. Josph Hyrtl, of Vienna, Austria.

A notice of these specimens soon after their arrival in this country was given by the late Prof. Edward D. Cope, entitled "Remarks on Hyrtl's Collection".[1] He stated that it comprised 800 skeletons, each with the branchial apparatus mounted separately. A large proportion of the specimens measured two feet in length and upwards. These specimens were prepared by Dr. Hyrtl himself, which was an unequalled guarantee of their completeness in all respects, to the most minute. The collection appears to have been commenced by Prof. Hyrtl not later than 1850, and had been an object of interest to ichthyologists and anatomists for several years. It was considered probably the most valuable collection for study in this branch of science in existence. The collection was purchased by Cope and then finally bequeathed as a legacy to the University of Pennsylvania after Cope's death. It is now housed in the Zoological Laboratory of that institution.

---

[1] Proc. Amer. Philos. Soc., vol 12, 1871, p. 191.

In this connection acknowledgment is due to Dr. C. W. Metz, director of the Zoological Laboratory of the University, and Drs. J. Percy Moore and Olin E. Nelsen, in whose care the collection has been placed, for granting permission to study and report on these materials. I am also grateful for many favors and helpful advice while examining the specimens in the University.

I wish especially to thank Dr. W. Dwight Pierce, of the Los Angeles County Museum of Science and Art, in California, for submitting his synopsis of classification in the fish section of his MS. work on the classification of animals. As this work is quite extensive and complete, it contains many valued citations of original sources I had failed to locate. All such are indicated by placing Dr. Pierce's name after the reference. In cases of new or unpublished names the proposal he gives is used exactly as he indicates and is intended to be credited entirely to him. Dr. Pierce's wide knowledge of natural history bibliography, and his work with the staff here in the Academy in connection with 'Biological Abstracts', have afforded him exceptional advantages in perfecting a taxonomic work such as he has outlined.

In the arrangement of groups I have largely followed Prof. Leo S. Berg's 'Classification of Fishes, both recent and fossil'.[2] In the writer's opinion adherence strictly to priority, rather than the adoption of preoccupied names or nomina conservanda, no matter how desirable, often leads to a greater confusion. Extinct forms are indicated by the prefixed dagger.

Class LEPTOCARDIA Heckel
Subclass **Abranchio** Bonaparte
Order BRANCHIOSTOMIFORMES emendation
Type family *Branchiostomidae* Bonaparte

Branchiostomi Whitley, Australian Zoologist, vol. 7, pt. 3, Sep. 15, 1932, p. 256.
Also *Amphioxini* Mueller 1844 and *Amphioxi* Bonaparte 1846.

Class MYXINI Berg
Subclass **Myxinia** Garman
Order MYXINIFORMES Berg
Family **HOMEIDAE** Garman
Subfamily HOMEINAE new name
Type genus *Homea* Fleming

Heptatremini Bonaparte, Conspect. Syst. Ichth., 1850, table.

---

[2] Travaux Inst. Zool. Acad. Sci. URSS., tome 5, livr. 2, 1940, pp. 346-517 (English translation).

Gill openings 6 or 7 on each side of body. Base of tongue situated between anterior pair of gills.

Subfamily DODECATREMATINAE new

Type genus *Dodecatrema* new

Gill openings 11 or more on each side of body. Base of tongue situated between seventh and eighth pairs of gills.

Genus **DODECATREMA** new

The Borers

Type *Bdellostoma polytrema* Girard

Polistotrema Gill, in Jordan and Gilbert, Proc. U.S Nat. Mus., vol. 3, 1880(1881), p. 458. Type *Polistotrema dombeyi* [Shaw] (Mueller) Gill, monotypic. (Misidentification for *Bdellostoma polytrema* Girard, credited to San Francisco and Monterey Bay, California.)—Gill, in Jordan and Gilbert, op. cit., vol. 4, 1881(1882), p. 30 (diagnosis; same genotype as preceding).

Polytrema Girard, Rep. U.S.Naval Astronom. Exped. South. Hemisphere, vol. 5, pt 2, 1855, p. 251. Type *Bdellostoma polytrema* Girard, (Preoccupied by *Polytrema* Rafinesque 1819 in echini, Férrusac 1822 in crustacea, Risso 1826 in protozoa, d'Orbigny 1850 in bryozoa.)

The genotype *Polistotrema dombeyi* Mueller [= *Gastrobranchus dombey* Shaw 1804] is Chilean and is identifiable with *Homea cirrhata* (J. R. Forster). The generic name *Polistotrema* Gill 1881 is thus synonymous with *Homea* Fleming 1822.

(*δώδεκα* twelve, indicates the usual number of gill-openings present + *τρῆμα* aperture or gill opening.)

Dodecatrema polytrema (Girard) Valparaiso, Chile.

Dodecatrema stoutii (Lockington) California, Oregon, Washington, British Columbia, Alaska.

†Class PTERASPIDES Berg

†Order PTERASPIFORMES Berg

†Suborder PTERASPIDOIDEI emendation

Type family *Pteraspididae* W. D. Pierce, emendation

Pteraspidi Jaekel, Die Wirbeltiere, Berlin, 1911, p. 22 (preoccupied by Zittel 1887 as order).

Same as *Pteraspidae* Berg 1940. Includes *Weigeltaspidae.*

†Order CYATHASPIFORMES Berg

†Family **AMERICASPIDAE** new name

Type genus *Americaspis* White and Moy-Thomas

Palaeaspidae Kiaer, Vidensk. Skrift. Math.-Klasse, Oslo, 1924, no. 6.

Required, as *Americaspis* White and Moy-Thomas 1941 replaces *Palaeaspis* Claypole 1884, which last is preoccupied by Gray 1863.

†Family **DICTYASPIDELLIDAE** new name

Type genus *Dictyaspidella* Strand

Dictyonaspidae Berg, Travaux Inst. Zool. Acad. Sci. URSS., vol. 5, livr. 2, 1940, p. 362.

The above family name required, as *Dictyaspidella* Strand 1934 replaces *Dictyonaspis* Kiaer 1932, which latter is preoccupied by Heckel 1887 in rhizopods.

†Class CEPHALASPIDES Berg

†Order CEPHALASPIDIFORMES Berg

†Suborder CEPHALASPIDOIDEI emendation

Type family *Cephalaspidae* Owen

Cephalaspidi Jaekel, Die Wirbeltiere, Berlin, 1911, p. 34.

Besides the *Cephalaspidae* Owen, and the three families included below, this order includes the *Atelaspidae* Traquair.

†Subfamily CEPHALASPIDINAE W.D.Pierce, new name

Type genus *Cephalaspis* Agassiz

Cephalaspidini Bonaparte, Cat. Metod. Pesc. Europ., 1846, p. 4.

†Family **KIAERASPIDAE** W.D.Pierce, new name

Type genus *Kiaeraspis* Stensio

Shield of head long and narrow, cornua small, variably directed. Devonian.

†Family **THYESTEIDAE** W.D.Pierce, emendation

Type genus *Thyestes* Eichwald

Thyestidae Rohon, Sitzs. Kon. Boehm. Gesell. Wiss., Prag, 1896(1897), p. 21.

†Family **SCLERODONTIDAE** emendation

Type genus *Sclerodus* Agassiz

Sclerodidae Berg, Travaux Inst. Zool. Acad. Sci. URSS, tome 5, livr. 2, 1940, p. 357.

†Order STIGMOLEPIDIFORMES new name

Type family *Stigmolepidae* new name

Tremataspidiformes Berg, Travaux Inst. Zool. Acad. Sci. URSS., tome 5, livr. 2, 1940, p. 357.

†Family **STIGMOLEPIDAE** new name

Type genus *Stigmolepis* Pander

Tremataspidae Woodward, Cat. Foss. Fishes Brit. Mus., pt. 2, 1891, p. 201.

Alternation required, as *Stigmolepis* Pander 1856 preoccupies *Odontotodus* by page priority. Also includes *Tremataspis* Schmidt 1866.

†Order Birkeniiformes Berg

†Suborder BIRKENIOIDEI new name

Type family *Birkeniidae* Bridge

Barycnemata Stromer, Sitzs. Bayer. Akad. Wiss. 1926, p. 93.

†Family **PTEROLEPIDOPIDAE** new name

Type genus *Pterolepidops* new

Pterolepidae Kiaer, Vidensk. Skrift. Math.-Klasse, Oslo, 1924, no. 6, p. 134.

†Genus **PTEROLEPIDOPS** new

Type *Pterolepis nitidus* Kiaer

Pterolepis [Rambur 1838]; Kiaer, Skrift. Vidensk. Math.-Klasse, Oslo, 1911, no. 7, p. 18.

Based on Kiaer's description, but not identifiable with Rambur. (*Pterolepis* + ὤψ appearance.)

†Pterolepidops nitidus (Kiaer)

†Order Lasaniiformes Berg

†Suborder LASANIOIDEI new name

Type family *Lasaniidae* Goodrich

Oligocnemata Stromer, Sitzs. Bayer. Akad. Wiss, 1926, p. 93.

†Class COCCOSTEI Berg

†Order Astrolepiformes Berg

†Suborder ASTROLEPOIDEI emendation

Type family *Astrolepidae* Traquair

Asterolepidi Jaekel, Die Wirbeltiere, Berlin, 1911, p. 38.

†Suborder ARCTOLEPOIDEI emendation

Type family *Arctolepidae* Berg

Arctolepida Romer, Vertebrate Paleontology, ed.2, 1945, p. 574 (as infraorder; also includes *Acanthaspidi* Jaekel 1911).

†Suborder PHLYCTAENIOIDEI new name

Type family *Phlyctaeniidae* new name

Phlyctaenaspi Jaekel, Die Wirbeltiere, Berlin, 1911, p. 46.

Includes *Euarthrodira* Romer 1945, preoccupied by Berg 1940.

†Family **PHLYCTAENIIDAE** new name

Type genus *Phlyctaenius* Traquair

Phlyctaenaspidae Woodward, Text Book Palaeont. Zittel, vol. 2, 1939, p. 42.

Includes *Mediaspidae* Heintz 1929.

†Subfamily PHLYCTAENIINAE new name

Type genus *Phlyctaenius* Traquair

Phlyctaenaspinae Hay, Carnegie Inst. Wash. Publ., no. 390, vol. 1, 1929, p. 651.

This and the preceding names stemming from *Phlyctaenius* Traquair 1890 are required, as that name has priority over *Phlyctaenaspis* Traquair. *Phlyctaenium* Zittel 1878 not involved.

†Suborder COCCOSTEIOIDEI new name

Type family *Coccosteidae* Traquair

Coccosteiformes Hay, Carnegie Inst. Wash. Publ., no. 390, vol. 1, 1929, p. 645.

Includes synonyms *Arthrothoraci* Dean 1901, *Temnothoraci* Goodrich 1909 and *Homostei* Jaekel 1911.

†Family **ICHTHYOSAUROIDIDAE** new name

Type genus *Ichthyosauroides* Kutorga

Heterostiidae Berg, Travaux Inst. Zool. Acad. Sci. URSS., tome 5, livr. 2, 1940, p. 368.

New family name required, as *Ichthyosauroides* Kutorga 1837 has priority over *Heterostius* Asmuss 1856 and *Heterosteus* Woodward 1891.

†Family **BRACHYDEIRIDAE** emendation

Type genus *Brachydeirus* Koenen

Brachydiridae Gross, Abhandl. Preuss. Geol. Landesanstalt, neue folge, heft 154, 1933, p. 40 (name only).

†Suborder AULACOSTEOIDEI new name

Type family *Aulacosteidae* new name

Ptyctodontidae Gross, op. cit., p. 56 (as suborder).

†Family **AULACOSTEIDAE** new name

Type genus *Aulacosteus* Eichwald

Ptyctodontidae Woodward, Cat. Foss. Fishes Brit. Mus., pt. 2, 1891, p. 37. (Includes *Pyctodontidae* Regan 1906.)

The above changes necessary, as *Aulacosteus* Eichwald 1849 has priority over *Ptyctodus* Pander 1858.

†Suborder PHYLLOLEPIDOIDEI emendation

Type family *Phyllolepidae* Woodward

Phyllolepida Romer, Vertebrate Paleontology, ed. 2, 1945, p. 575 (as suborder without definition; includes only family *Phyllolepidae*, represented by *Phyllolepis* = *Pentagonolepis*).

†Suborder MACROPETALICHTHYOIDEI emendation

Type family *Macropetalichthyidae* Eastman

Macropetalichthyiformes Hay, Carnegie Inst. Wash. Publ., no. 39, vol. 1, 1929, p. 644 (=*Arthrodira* Dean 1900; *Petalichthyi* Jaekel 1911).

†Suborder STENSIOELLOIDEI emendation

Type family *Stensioellidae* Brioli

Stensioellida Romer, Vertebrate Paleontology, ed. 2, 1945, p. 474 (includes families *Stensioellidae* and *Cratoselachiidae*).

†Suborder GEMUENDINOIDEI new name

Type family *Gemuendinidae* White

Rhenanida Gross, Abhandl. Preuss. Geol. Landesanstalt, neue folge, heft 154, 1933, p. 56 (as suborder).

†Class ACANTHOESSI new name

Acanthodei Owen, Lect. Comp. Anat. Vertebrates, 1846, p. 50.

Change required, as *Acanthoessus* Agassiz 1832 earliest name. Includes *Acanthodii* Giebel 1855, *Acanthodini* Luetken 1868, *Acanthodi* Gadow 1898 and *Acanthodia* Dean 1900.

†Suborder DIPLOCANTHOIDEI new name

Type family *Diplocanthidae* emendation

Diplacanthi Jaekel, Die Wirbeltiere, Berlin, 1911, p. 12 (preoccupied by Fitzinger 1873 as family) (also includes synonym *Goniolepides* Bleeker 1859).

†Family **DIPLOCANTHIDAE** emendation

Type genus *Diplocanthus* Duff

Diplacanthi Fitzinger, Sitzs. Akad. Wiss. Wien, vol. 67, pt. 1, 1873, p. 512 (also includes *Diplacanthoidei* Bleeker 1859 and *Dilplacanthidae* Cope 1891).

Change required, as *Diplocanthus* Duff 1842 preoccupies *Diplacanthus* Agassiz 1845.

†Order ACANTHOESSIFORMES new name

Type suborder *Acanthoessoidei* name name

Acanthodiformes Berg, Travaux Inst. Zool. Acad. Sci. URSS., tome 5, livr. 2, 1940, p. 374 (includes *Proganoides* Heckel 1895).

†Suborder ACANTHOESSOIDEI new name

Type family *Acanthoessidae* Hay

Acanthodini Heckel, Syst. Phyl. Wirbelth., vol. 3, 1895, p. 236.

Name required, as *Acanthoessus* Agassiz 1832 has priority over *Acanthodes* Agassiz 1833.

Class SQUALI Goldfuss

†Suborder XENACANTHOIDEI new name

Type family *Xenacanthidae* Hoernes

Pleuracanthides Heckel, op. cit., p. 236 (also *Ichthyogonides* Hoernes 1895).

†Suborder PALAEOSQUALOIDEI new name

Type family *Cladodontidae* Nicholson and Lydekker

Palaeosquali Jaekel, Die Wirbeltiere, Berlin, 1911, p. 60 (as suborder) (comprises *Cladodontidae, Pleuracanthidae* and *Chlamydoselachidae*).

†Suborder EDESTOIDEI emendation

Type family *Edestidae* Jaekel

Edestida E.G.White, Amer. Mus. Novitates, no. 837, April 3, 1936, p. 5 (as suborder).

Known only from peculiar teeth.

Order HEXANCHIFORMES Buen

Family **HEXANCHIDAE** Gill

Subfamily HEXANCHINAE new name

Type genus *Hexanchus* Rafinesque

Notidanini Bonaparte, Nuovi Ann. Sci. Nat. Bologna, anno 1, tomo 2, 1838, p. 130 (as subfamily).

Gill openings 6 each side.

Subfamily HEPTRANCHIINAE new

Type genus *Heptranchias* Rafinesque

Gill openings 7 each side.

Order CHLAMYDOSELACHIFORMES new name

Type family *Chlamydoselachidae* Garman

Selachophidichthyoidei Jordan, Stanf. Publ., Univ. Ser. Biol. Sci., vol. 3, no. 2, 1923, p. 97 (as order).

Pternodonta Jordan, op. cit., (name in synonymy; without source, reference or author).

Family **CHLAMYDOSELACHIDAE** Garman

†Genus CHLAMYDOSELACHOIDES new

Type *Chlamydoselachus lawleyi* J.W.Davis

Known only from detached teeth, figured and noticed by Lawley as belonging to the living *Chlamydoselachus*. They differ however, slightly but surely from the living genus.

(*Chlamydoselachus* + *οιδής* appearance.)

†Chlamydoselachoides lawleyi (J. W. Davis)

Chlamydoselachus lawleyi J.W.Davis, Proc. Zool. Soc. London, 1887, p. 542 (on R.Lawley, Nuov. Stud. Pesc. Coll. Toscane, 1876, p. 87, pl. 1, fig. 1, type locality, Orciano, Tuscany, Italy; Pliocene).

Lawley's figs. 1 a-c show the three main cusps of the tooth less symmetrically disposed than in Garman's living *Chlamydoselachus anguineus*.[3] Thus the median cusp, though always the longest, is more dextral in *C. lawleyi* (figs. 1-1a), shown as median by Garman (figs. 1 and 4) in *C. anguineus;* base of the tooth little more inclined in *C. lawleyi* (fig. 1c) and would fall much lower than the tip of the outer cusp (in *C. anguineus,* the base seems equally inclined as the outer cusps) (figs. 1, 3 and 4 in Garman). The greatest width of the base of the tooth is subequal with its height as shown by Lawley (figs. 1-1a); greatly higher than its width as indicated by Garman (figs. 1, 3 and 4). The concavities on the basal width view (fig. 1a in Lawley and fig. 4 in Garman), while half the basal height in each are relatively much broader as shown by Lawley. Lawley's figure (1b) of a small tooth shows similar asymmetry in the median cusp, with proportions otherwise similar to the other teeth.

†Chlamydoselachoides tobleri (M. Leriche)

Chlamydoselachus tobleri M.Leriche, Bull. Soc. Geol. Paleont. Hydr. Bruxelles, vol. 38, 1929, p. 56, figs. 1-2 (type locality, West Indies; Oligocene or Miocene?).

Order LAMNIFORMES Berg

Superfamily *Orectoloboidae* emendation

Type family *Orectolobidae* Regan

Orectoloboidea E.G.White, Amer. Mus. Novitates, no. 237, April 3, 1936, p. 4.

Family **ORECTOLOBIDAE** Regan

†Genus **PALAEOCROSSORHINUS** new

Type *Crossorhinus jurassicus* Woodward

"So far as preserved, there is nothing in the fossil thus described to separate it from the existing genus *Crossorhinus,* but it is distinguished from all known species by the simplicity of the dermal lappets fringing the head, and by the relatively large size of the pectoral fins." (A.S.Woodward.)

The above characters appear to me generic.

(παλαιὸς ancient + *Crossorhinus.*)

†Palaeocrossorhinus jurassicus (Woodward)

Crossorhinus jurassicus Woodward, Proc. Zool. Soc. London, 1918, p. 231, pl. 1, fig. 1 (type locality, Bavaria, Germany; Jurassic—Lithographic Stone).

---

[3] Bull. Mus. Comp. Zool., vol. 12, 1885, pp. 4-6, pl. 5, figs. 1-8(teeth).

Superfamily *Isuroidae* emendation

Type family *Lamnidae* Richardson

Isurina Gray, List Fish Brit. Mus., pt. 1, 1851, p. 52 (as tribe).

Includes *Isuroidei* Garman 1913, *Lamnoidae* Gill 1861, *Lamnoidea* Mueller and Henle 1838.

Family **RHINCODONTIDAE** Garman

Subfamily RHINCODONTINAE emendation

Type genus *Rhincodon* A.Smith

Rhinodontini Bonaparte, Cat. Metod. Pesc. Europ., 1846, p. 3.

Also *Rhinodontinae* Goodrich 1909 and *Rhineodontini* Berg 1940.

Family **ALOPIIDAE** Jordan and Gilbert

Subfamily ALOPIINAE emendation

Type genus *Alopias* Rafinesque

Alopiadini Bonaparte, Nuovi Ann. Sci. Nat. Bologna, anno 1, tomo 2, 1838, p. 130.

Also *Alopecini* Bonaparte 1846, *Alopecinae* Gill 1861 and *Alopiini* Berg 1940.

Superfamily *Carcharoidae* emendation

Type family *Carchariidae* Jordan and Gilbert

Carcharoidei Garman, Mem. Mus. Comp. Zoöl., vol. 36, 1913, pp. 10, 11.

Also *Odontaspidiana* Gray 1851 as tribe and *Odontaspoidea* E.G.White 1936.

Family **SCAPANORHYNCHIDAE** E.G.White

†Subfamily SCAPANORHYNCHINAE emendation

Type genus *Scapanorhynchus* Woodward

Scapanorhynchini Berg, Travaux Inst. Zool. Acad. Sci. URSS., tome 5, livr. 2, 1940, p. 380.

Body slender. Snout much elongated. Teeth with long, slender, principal cusp, mostly with pair of minute lateral cusps. Caudal, one-half to nearly equal to trunk in advance of its origin.

Subfamily MITSUKURININAE new

Type genus *Mitsukurina* Jordan

Differs from *Scapanorhynchus* in the shorter rostral extension and the caudal longer than the trunk.

Suborder GALEORHINOIDEI new name

Type family *Galeorhinidae* Gill

Galeoidei Bleeker, Act. Soc. Sci. Ind. Neerl., vol. 4, no. 3, 1859, p. xii (as suborder).

Also *Galeoidea* Romer 1945, *Carcharinida* E.G.White 1936 and *Anarthri* Gill 1883.

Superfamily *Scyliorhinoidae* emendation

Type family *Scyliorhinidae* Fowler

Scylliorhinoidea Gregory, Ann. N.Y.Acad. Sci., vol. 17, pt. 2, 1907, p. 446.

Also *Scyliorhinoidei* Berg 1840 as suborder.

Family **SCYLIORHINIDAE** Fowler

Subfamily CANINOINAE emendation

Type genus CANINOA Nardo

Caninoini Nardo, Ann. Sci. Lombardo-Veneto, vol. 13, 1844, pp. 8-9.

Teeth equal, triangular, acute, denticulate at base, obtuse toward mouth angles. Gill openings 5. No spiracle. One dorsal. Anal present. (Nardo.)

Subfamily GALEINAE Fowler

†Genus **MACROUROGALEUS** new

Type *Pristiurus hassei* Woodward

Tail as measured behind the second dorsal fin equals length of the trunk measured before second dorsal. Second dorsal above hind part of anal.

Based on nearly complete shark of small size. It differs from *Galeus* Rafinesque (*Pristiurus* Bonaparte) in its greatly elongated tail.

(*μακρὸς* long + *οὐρὰ* tail + *Galeus*.)

†Macrourogaleus hassei (Woodward)

Subfamily SCYLIORHININAE emendation

Type genus *Scyliorhinus* Blainville

Scylliorhininae Gill, Ann. Lyc. Nat. Hist. N.Y., vol. 7, 1862, pp. 406, 407.

Also *Scyllini* Bonaparte 1838, *Scylliini* Bonaparte 1846, *Scyllida* Schmarda 1871 and *Scylliinae* Goodrich 1909.

Subfamily CEPHALOSCYLLIINAE new

Type genus *Cephaloscyllium* Gill

Characterized chiefly by the greatly inflatable belly. Labial folds absent or rudimentary. Posterior nasal valves present.

Superfamily *Galeorhinoidae* emendation

Type family *Galeorhinidae* Gill

Galeorhinoidea Gill, Smithson. Miscell. Collection, no. 283, 1873, p. 12.

Also *Carchariae* Mueller and Henle 1841, *Galei* Mueller and Henle 1841, *Scylliodontes* Mueller and Henle 1841, *Nictitantes* Mueller 1841 and *Carcharinoidea* E.G.White 1936.

Subfamily HEMIPRISTINAE new

Type genus *Hemipristis* Agassiz

Spiracle large. Teeth triangular, both coronal edges becoming coarsely serrated towards apex.

Family **MUSTELIDAE** Richardson

Subfamily EMISSOLINAE new

Type genus *Emissola* Jarocki

Emissolidae Whitley, Fishes of Australia, vol. 1, Sharks, 1940, p. 68 (as family). Type genus *Emissola* Jarocki.

Teeth small, equal, numerous, with stronger median cusp and one or three small lateral cusps. Nostrils nearer mouth than snout end. Caudal with pit. Subcaudal produced.

Superfamily *Pseudotriakoidae* emendation

Type family *Pseudotriakidae* Jordan and Evermann

Pseudotriakoidei Fowler, Bull. U.S.Nat. Mus., no. 100, vol. 13, 1941, p. 14 (as suborder).

First dorsal long low keel, premedian in body.

Subfamily PSEUDOTRIAKINAE emendation

Type genus *Pseudotriakis* Capello

Pseudotriacinae Gill, Mem. Nat. Acad. Sci., vol. 16, 1892, p. 130 (as subfamily).

Superfamily *Sphyrnoidae* emendation

Type family *Sphyrnidae* Gill

Sphyrnoidei Fowler, Bull. U.S.Nat. Mus., no. 100, vol. 13, 1941, p. 14 (as suborder).

Head greatly to widely separated across the orbital region. Denticles with keel on flat surface, keels shell like. Spiral valves of intestine of scroll-like type. Heart valves in 3 rows. Claspers with an abdominal siphon only.

Order SQUALIFORMES Berg

Superfamily *Echinorhinoidae* emendation

Type family *Echinorhinidae* Gill

Echinorhiniformes Buen, Cat. Ict. Med. Espan. Marruecos, 1926, p. 29.

Body partly fusiform, longer than tail, which is short and without lateral folds or pits. Snout short, broad, tapering. Teeth alike in both jaws. Skin with scattered tubercles or bucklers.

Order PRISTIOPHORIFORMES emendation

Type superfamliy *Pristiophoroidae* emendation

Pristiophori Whitley, Fishes of Australia, vol. 1, Sharks, 1940, p. 69.

Snout greatly elongated, flattened blade, each side with row of sharp teeth, similar to " saw " of sawfishes (*Pristidae*). Barbel below each side of blade shortly before nostrils. Range from Cretaceous and Tertiary to recent.

Superfamily *Pristiophoroidae* emendation

Type family *Pristiophoridae* Guenther

Pristiophoridea E.G.White, Amer. Mus. Novitates, no. 837, April 3, 1936, p. 5 (as superfamily).

Snout produced in living forms. Gill openings 5 or 6. Vertebrae cyclopspondylic. Dorsal fin spineless.

Subfamily PLIOTREMATINAE new

Type genus *Pliotrema* Regan

Gill openings 6 on each side of neck.

Subfamily PRISTIOPHORINAE new

Type genus *Pristiophorus* Mueller and Henle

Gill openings 5 each side of neck.

Superorder *RAJIOIDEA* emendation

Type order *Rajiformes* Berg

Raii Gray, List Fish Brit. Mus., pt. 1, 1851, p. 81 (as section).

Also *Platosomeae* E.G.White and *Hypotremata* E.G.White.

Order RAJIFORMES Berg

Superfamily *Pristoidae* emendation

Type family *Pristidae* Owen

Pristoidea Gill, Mem. Nat. Acad. Sci., vol. 6, 1893, p. 130 (as series).

Also *Squatinorajae* Mueller and Henle 1841, *Pachyura* Gill 1872, *Sarcura* Gill 1893 and *Rhinobatoidea* E.G.White 1936.

Family **DASYATIDAE** Jordan and Evermann

†Genus **PALAEODASYBATIS** new

Type *Palaeodasybatis discus* new species

Body rounded or with nearly circular disk. Tail slightly shorter than disk, armed with 2 spines. Shoulder girdle well postmedian in length of disk. Structure and details of head and thorax not clearly defined. Pectoral fins appear to have been united before rostral cartilages. Pelvis advanced, falls but slightly behind last fourth in length of disk, without anterior extensions. Ventral fins moderately large.

This genus is related to *Xiphotrygon* Cope, differing chiefly in its rounded or circular disk-like body. The metapterygium of the pectoral fin is greatly shorter than the propterygium. The pelvic arch is well advanced in the vertebral region behind the shoulder girdle, and the shoulder girdle thus falls well postmedian in the length of the disk. The caudal spines appear depressed, greatly like those of the living *Dasyatis*.

(παλαιὸς ancient + *Dasybatis*.)

†**Palaeodasybatis discus** new species

Length and width of disk about equal. Tail attenuated to slender point. Caudal spines rather long, depressed, each with rather feeble, small, marginal antrorse serrae, and most distinct terminally on spine edges.

Pectoral rays 83-88; ventral rays 24-25. Shoulder girdle well postmedian in disk length, or within first third of the pectoral metapterygium and length of latter about $\frac{2}{3}$ to $\frac{3}{4}$ in the pectoral propterygium. Pelvic arch falls about last fourth in disk length and metapterygium of either ventral equals front width of skull. The 2 pressed caudal spines are with the first inserted midway between the anterior pelvic arch and the tip of the tail.

General color of plinth, pale gray or drab, the impression of the fossil brown with the cartilages all darker or blackish brown.

A.N.S.P., no. 8344. Green River Shales, Wyoming. Eocene. Joseph Jeanes. Length 345 mm. Type.

The above species is evidently based on a female and is strikingly dissimilar from Cope's *Xiphotrygon acutidens*, which has been identified with *Heliobatis radians* Marsh[4] and accorded priority. Marsh says: "It differs much from recent Rays, and resembles most nearly the genus *Cyclobatis* of Egerton, from the Mt. Lebanon deposits of Syria, which are probably in the same horizon as the locality of the present species. The latter differs from *Cyclobatis* in having a much greater number of radiating digits, which entirely encircle the body, and suggested the generic name. There are also numerous dermal defensive tubercles, which are wanting in *Cyclobatis*.

Antero-posterior extent of rays 235 mm.

Transverse diameter across scapular arch to bases of rays 75 mm.

Total transverse diameter 220 mm.

Distance between scapular and pelvic arches 55 mm.

Length of vertebrae at pectoral arch 2.6 mm.

Length of vertebrae at caudal region 2. mm."

The above imperfect notice is hardly a description, leaving much to be revealed without a figure. The proportions, however, with the disk longer than broad, indicate it is possibly allied with Cope's *Xiphotrygon*. Cope's contention that "The presence of several tubercles mentioned by Marsh indicates that it is a different species at least from the *Xiphotrygon acutidens*," may be correct.

---

[4] Amer. Journ. Sci., ser. 3, vol. 14, 1877, p. 256 (type locality, "Green River beds of Wyoming").

(δισκος disk.)

Family **UROGYMNIDAE** Whitley

Subfamily UROGYMNINAE new name

Type genus *Urogymnus* Mueller and Henle

Anacanthini Bonaparte, Nuovi Ann. Sci. Nat. Bologna, anno 1, tomo 2, 1838, p. 130.

Head somewhat prominent. Mouth waved, transverse. Teeth tesselated, flattened, rhomboid. Spiracle large. No dorsal fin.

Suborder TORPEDINOIDEI emendation

Type family *Torpedinidae* Richardson

Torpedoidei Fowler, Bull. U.S.Nat. Mus., no. 100, vol. 13, 1941, p. 290.

Class HOLOCEPHALA Bonaparte

†Order SQUALORAJIFORMES emendation

Type suborder *Squalorajoidei* emendation

Squalorajea E G.White, Amer. Mus. Novitates, no. 837, April 3, 1936, p. 6 (as order).

Trunk depressed, elongated. Head produced into long slender snout. Lower dentition forms one pair, upper dentition two pairs of thin corrugated dental plates without definite tritors. Males with prehensile spine on snout. Numerous conical or stellate dermal denticles. Dorsal fin spine absent. Range, Lower Jurassic.

†Suborder SQUALORAJOIDEI emendation

Type family *Squalorajidae* Romer

Squalorajida E.G.White, Amer. Mus. Novitates, no. 837, April 3, 1936, p. 6 (as suborder).

Suborder CHIMAEROIDEI emendation

Type family *Chimaeridae* Bonaparte

Chimaeroideri Huxley, Sci. Mem. Huxley, Forster and Lankester, 1883, p. 571.

Also *Chimeria* Gray 1851 as section, *Chimaeracei* Heckel 1873, *Chasmatopnea* Regan 1912 and *Chimaerida* E.G.White 1938 (preoccupied by Schmarda 1871 in family).

Order CALLORHINCHIFORMES new name

Type suborder *Callorhinchoidei* emendation

Callorhinchoidei Fowler, Bull. U.S.Nat. Mus., no. 100, vol. 13, 1941, p. 503 (as order).

Snout produced more or less as proboscis. Claspers simple.

Suborder CALLORHINCHOIDEI emendation

Type family *Callorhinchidae* Fowler

Callorynchoidea Whitley, Fishes of Australia, pt. 1, Sharks, 1940, p. 69.

†Subclass **Petalodontes** new name

Type order *Petalodontiformes* new name

Bradyodonteae E.G.White, Amer. Mus. Novitates, no. 837, April 3, 1936, p. 5 (as superorder).

Teeth very few during lifetime, in slow succession. Placoid scales often fused into plates. An imperfectly defined group.

†Order PETALODONTIFORMES new name

Type suborder *Petalodontoidei* emendation

Bradyodontea E.G.White, Amer. Mus. Novitates, no. 837, April 3, 1936, p. 5 (as order).

One pair of dental plates above and below. Teeth as arranged in mouth form close pavement.

Suborder PETALODONTOIDEI emendation

Type family *Petalodontidae* Newberry and Worthen

Petalodontoidea Hay, Bull. U.S.Geol. Surv., no. 179, 1902, p. 275.

Also *Brayodontia* E.G.White 1936, *Ststodonti* Jaekel 1899 and *Janassides* Jordan 1923.

Class DIPNOI Mueller

Order CERATODONTIFORMES Berg

Suborder CERATODONTOIDEI emendation

Type family *Ceratodontidae* Gill

Ceratodina Heckel, Syst. Phyl. Wirbelth., vol. 3, 1895, p. 285 (as suborder).

Also *Monopneumona* Kingsley 1885 and *Archidipnoa* Heckel 1895.

Order LEPIDOSIRENIFORMES Berg

Suborder LEPIDOSIRENOIDEI new name

Type family *Lepidosirenidae* Agassiz

Neodipneusta Heckel, Syst. Phyl. Wirbelth., vol. 3, 1895, p. 264 (as order), p. 265 (as suborder).

Also *Protopterina* Heckel 1865 as suborder.

NOTULAE NATURAE

NUMBER 188 OF FEBRUARY 28, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

MELANOPLUS PLEBEJUS, INCLUDING TWO NEW SUBSPECIES (ORTHOPTERA: ACRIDIDAE: CYRTACANTHACRIDINAE)

BY H. RADCLYFFE ROBERTS

Assistant Curator of Insects, The Academy of Natural Sciences of Philadelphia

Differences in the male terminalia of *Melanoplus plebejus* from Dallas and Brownsville, Texas and southern Tamaulipas, Mexico have been evident to Mr. Morgan Hebard and myself for some time. Recently Dr. Ashley B. Gurney, Division of Insect Identification, U. S. Dept. of Agriculture, received some specimens from Brownsville, and, likewise noting this geographic differentiation, kindly sent them to me for study. In order to make known promptly the subspecific elements of this polytypic species, this paper is presented in advance of a comprehensive study of the Mexican Melanopli. I am indebted to Dr. Carl O. Mohr of the Illinois State Natural History Survey for the loan of their material of this species, which is here recorded.

Melanoplus plebejus plebejus (Stål) Figs. 1 to 4.

Pezotettix (*Paroxya*) *plebejus* Stål, 1878, Bih. Svenska Vet.-Akad. Handl., V, no. 9, p. 12 (type locality: Dallas,[1] Texas).

Pezotettix pupaeformis Scudder, 1879, Proc. Boston Soc. Nat. Hist., XX, p. 72 (type locality: Dallas, Texas). Scudder, 1897, Proc. U. S. Nat. Mus., XX, p. 326 (synonymized).

Melanoplus plebejus (Stål). Scudder, 1897, loc. cit., p 326.

Though Scudder (1897, cited above) stated that this species resembled *M. flabellatus,* I find nothing to indicate that *M. plebejus* has any very close relationship to it. The male cercus and subgenital plate of *M. flabellatus* is of a different type, and these features of *plebejus* suggest an origin from another stock. The male cercus and subgenital plate of *plebejus* are most similar to those of *M. rusticus,* and therefore suggest placing the species in or close to the Tribulus Group of species of which *rusticus* is a member. This species group differs, however, in having furculae present and apices of the tegminal pads rounded.

---

[1] Stål gave Texas only as the type locality for his material, but since Belfrage and Boll collected most of Stål's material, and these collectors worked mainly in the vicinity of Dallas, this locality is tentatively selected as the type locality.

All subspecies of *M. plebejus* are best recognized by the broad, more or less pointed tegminal pads (figs. 3, 7 and 11), blue hind tibiae, and by the male terminalia: obsolete furculae; small subgenital plate with dorsal margin transverse and incurved; cerci as shown in figs. 4, 8 and 12. Frequently females have a characteristic pale stripe diagonally crossing the black area of the pronotal lobes in the direction of the ventral margin of the eye. This is an unusual retention of the immature color pattern. For diagnostic features of this subspecies refer to *M. plebejus cameronis.*

Isely (1937) [2] observed that this subspecies in the vicinity of Waxahachie, Texas occurs adult in greatest numbers during August and September, and characterizes it as an inhabitant of " shallow soils ". He illustrates such a habitat by a photograph of a chalk slope with sparse grass and scattered cedars. In a subsequent paper [3] he observed that it was one of the few Cyrtacanthacridinae that definitely preferred grass as a food, and later [4] confirmed this observation by finding that its mandibular structure was of the graminivorous type.

In Rehn and Hebard's notebooks for Texas I find the following data: Dallas—field of tall grass on edge of woods, tall grasses in native prairie, and tall grasses and weeds under trees; Flatonia—in weeds of field on edge of bottom woods; San Antonio—among various vines and high dry grasses on ground; Dickinson—open short grass spots in pine woods. Morse [5] stated, " while a campestrian species, it is practically a thicket dweller, living among the denser growth of grasses and other herbage in moist prairie meadows ".

Distribution.—Limital records are the following: OKLAHOMA: Madill, Marshall Co.; Wilberton, Latimer Co. TEXAS: Paris, Lamar Co.; Elkhart, Anderson Co.; Galveston Co.; Robstown, Nueces Co.; Carrizo Springs, Dimmit Co.; Del Rio; Kerrville; Wichita Falls.

Specimens.[6]—OKLAHOMA: Wilberton, VIII, 27, 1905, 1 ♂ (Morse)

---

[2] Isely, F. B., 1937, Ecol. Mon., vol. 7, p. 323.

[3] Isely, F. B., 1938, Ecol. Mon., vol. 8, p. 577.

[4] Isely, F. B., 1944, Ann. Ent. Soc. Amer., vol. 37, p. 57.

[5] Morse, A. P., 1907, Carnegie Inst. Wash, publ. 68, p. 51.

[6] Names in parenthesis indicate the collector. All specimens are in the Academy of Natural Sciences of Philadelphia unless otherwise indicated in brackets.

[Morse, 1907, U. S. Nat. Mus.]; Caddo, VIII, 8, 1905 [Morse, 1907, specimens not seen]; 7 miles southeast of Madill, Marshall Co., VIII, 30, 1939, 7 ♂, 4 ♀ (Rehn and Rehn). TEXAS: Wichita Falls, Wichita Co., VIII, 15-16, 1905 [Morse, 1907, specimens not seen]; Paris, Lamar Co., 1 ♂ (C. R. Jones) [U. S. Nat. Mus.]; Dallas, 1 ♂ [Scudder, 1897]; Dallas, 1 ♂, 1 ♀ (Boll) [Scudder, 1879 and 1897, paratypes of *M. pupaeformis*]; Dallas, VIII, 14-16, 1919, 18 ♂, 5 ♀, 1 juv. (Rehn and Hebard); Dallas, IX, 20, 1918, 1 ♂, and X, 1-6, 1918, 2 ♂, 1 ♀ (T. H. Hubbell); 15 miles west of Fort Worth, VIII, 2, 1934, 2 ♂, 1 ♀, 1 juv. (F. B. Isely); Commanche Co., IX, 4, 1928, 2 ♂, 3 ♀ (H. B. Parker); Elkhart, VIII, 16, 1915, 4 ♂ (Hebard); College Station, XII, 24-27, 1905, 2 ♂, 1 ♀ [Acad. Nat. Sci. Phila.], 4 ♂, 5 ♀ [Ill. Nat. Hist. Surv.]; Brazos Co., XII, 28, 1905, 1 ♀ [Acad. Nat. Sci. Phila.], 2 ♂, 9 ♀ [Ill. Nat. Hist. Surv.]; Navasota, VIII, 14, 1915, 13 ♂, 3 ♀, 1 juv. (Hebard); Temple, IX, 24, 1912, 4 ♂, 7 ♀ (Rehn and Hebard); Shovel Mountain, Burnet Co., X, 4, 1901, 4 ♂, 4 ♀ (F. G. Schaupp); Flatonia, Fayette Co., VIII, 19-20, 1912, 3 ♂, 1 ♀ (Rehn and Hebard); Landa Park, New Braunfals, Comal Co., IX, 6, 1942, 3 ♂, 2 ♀ (Roberts); Bexar Co., VIII, 14, 1929, 4 ♂, 1 ♀ (H. B. Parker); San Antonio, IX, 1, 1942, 1 ♂ (Roberts), VIII, 15-16, 1912, 11 ♂, 4 ♀ (Rehn and Hebard); Salado Creek, Ft. Sam Houston, San Antonio, VIII, 31, 1942, 1 ♂ (Roberts); Kerrville, Kerr Co., VIII, 17-18, 1912, 1 ♂, 2 ♀, 1 juv. (Rehn and Hebard); 11 miles northwest of Mountain House, Kerr Co., IX, 2, 1937, 3 ♂ (Rehn, Pate and Rehn); Del Rio, Valverde Co., VIII, 22-23, 1912, 1 ♂ (Rehn and Hebard); Houston, I, 6, 1906, 1 ♀ [Ill. Nat. Hist. Surv.]; Harrisburg, VIII, 13, 1915, 1 ♂ (Rehn and Hebard); Dickinson, Galveston Co., VII, 20, 1912, 1 ♂, 4 ♀, 1 juv. (Hebard); La Marque, Galveston Co., VII, 22, 1912, 1 ♂ (Hebard); Carrizo Springs, XI, 1884, 1 ♂, (A. Wadgymar); Rosenburg, Fort Bend Co., VII, 25-26, 1912, 9 ♂, 9 ♀, 1 juv. (Hebard); Brazoria Co., VIII, 9, 1928, 1 ♂ (R. H. Beamer); Victoria, VI, 1 ♂ (Caudell) [U. S. Nat. Mus.]; Black Bayou, V, 19, 1907, 1 ♀ [Ill. Nat. Hist. Surv.]; Beeville, Bee Co., VII, 28, 1912, 6 ♂, 2 ♀, 1 juv. (Hebard); Gregory, in cotton fields, VI, 15, 1908, 1 ♂ (E. S. Tucker); Robestown, Nueces Co., VIII, 9, 1912, 1 ♂, 1 ♀, 1 juv. (Hebard).

Melanoplus plebejus cameronis[7] new subspecies Figs. 5 to 8.

This subspecies, known only from the Brownsville area, is closely similar to *M. plebejus plebejus* except that the apices of the tegminal pads are decidedly attenuate (cf. figs. 3 and 7), and the aedeagus differs as shown in figs. 1, 2, 5 and 6. Specimens from two localities in the northern portion of Nueces Co. are considered as *M. p. plebejus,* but they show an approach towards this subspecies by the more than usually pointed tegminal pads. The aedeagus also shows a slight development towards the *cameronis* form. We have no material of this species to the south between Brownsville and Tampico. Tampico specimens are *M. plebejus torridus.*

---

[7] An allusion to Cameron Co., Texas.

It was not surprising to find one of the specimens from Brownsville almost fully alate, the tegmina reaching nearly to the genicular lobes of the hind femora and broadly rounded at the apex. A tegminal pad with the pointed or attenuate tip, as in this subspecies, is the transitional step in development between the brachypterous and the fully alate form.

Type.—♂; Brownsvile, Cameron Co., Texas, U. S. A. September 27-28, 1942. (H. R. Roberts.) [Acad. Nat. Sci. Phila., Type no. 5745.]

Refer to Scudder (1897) for general description of *M. plebejus.* The differences between the tegminal apices of this subspecies and that of *M. p. plebejus* can be seen by comparing figs. 3 and 7. A moderate amount of variation in the acuteness of these apices occurs in both subspecies, but there is a marked gap between the minimum acuteness of *cameronis* and the maximum of *plebejus.* The macropterous individual has been mentioned. The distal half of the cercus is more slender and slightly longer, but the difference is of such a slight degree that it is not useful as a diagnostic character. The aedeagus is proportionately longer and more slender, and the distal portion of the valves diverge strongly laterad (cf. figs. 1, 2, 5 and 6). The aedeagus shows an approach towards the form of *M. p. torridus.*

The female has been found to differ only by the more acute or attenuate tegminal pads. There is a moderate amount of variation in the size of the tegmina. Usually the tegmina overlap on the mid-dorsal line. In three females the dorsal margins are barely attingent, and in one female there is a gap of about a millimeter between the dorsal margins.

Specimens.[6]—TEXAS: same data as type, 3 ♂, 1 ♀, including 1 macropterous ♂; Brownsville, XI, 22, 1910, 1 ♂, XI, 23, 1911, 1 ♂, XI, 24, 1910, 1 ♂, XII, 10, 1910, 1 ♂ [Ill. Nat. Hist. Surv.], collected on cotton, VII, 2, 1945, 1 ♂ [U. S. Nat. Mus.]; Piper Plantation near Brownsville, VIII, 3, 1912, 4 ♂, 6 ♀ (Rehn and Hebard); Port Isabel, Cameron Co., VII, 2, 1912, 1 ♂, 2 ♀ (Hebard); Loma ?,[8] VII, 7, 1908, 1 ♂ [Acad. Nat. Sci. Phila.], 6 ♂, 2 ♀ [Ill. Nat. Hist. Surv.].

---

[8] The only town in Texas that I find by this name is in Walker Co. Though this material is typical *cameronis,* material from adjacent areas and those well to the south of Walker Co. are typical *p. plebejus,* and therefore strongly suspect that this is not the locality from where the specimens came. There are many low hills or old sand dunes between Brownsville and Port Isabel called Loma de —— which may have been the basis of the name on the label.

Melanoplus plebejus torridus[9] new subspecies Figs. 9 to 12.

Melanoplus plebejus (Stål). Bruner, Biol. Cent.-Amer., Orthoptera. II, p. 325, 1908 (Victoria, Tamps., Mex.). Hebard, Trans. Amer. Ent. Soc., LVIII, p. 286, 1932 (Tampico, Tamps., Mex.).

We have specimens of this subspecies from southern Tamaulipas and eastern San Luis Potosi only, but in all probability representatives of the species will be found between there and Texas. I have been unable to locate Bruner's specimens from Victoria, which he states were in the collection of the Illinois State Laboratory of Natural History. Dr. Carl O. Mohr tells me that they are not to be found in the collections of the Illinois State Natural History Survey. Bruner's record, though somewhat north of my localities, is probably this subspecies.

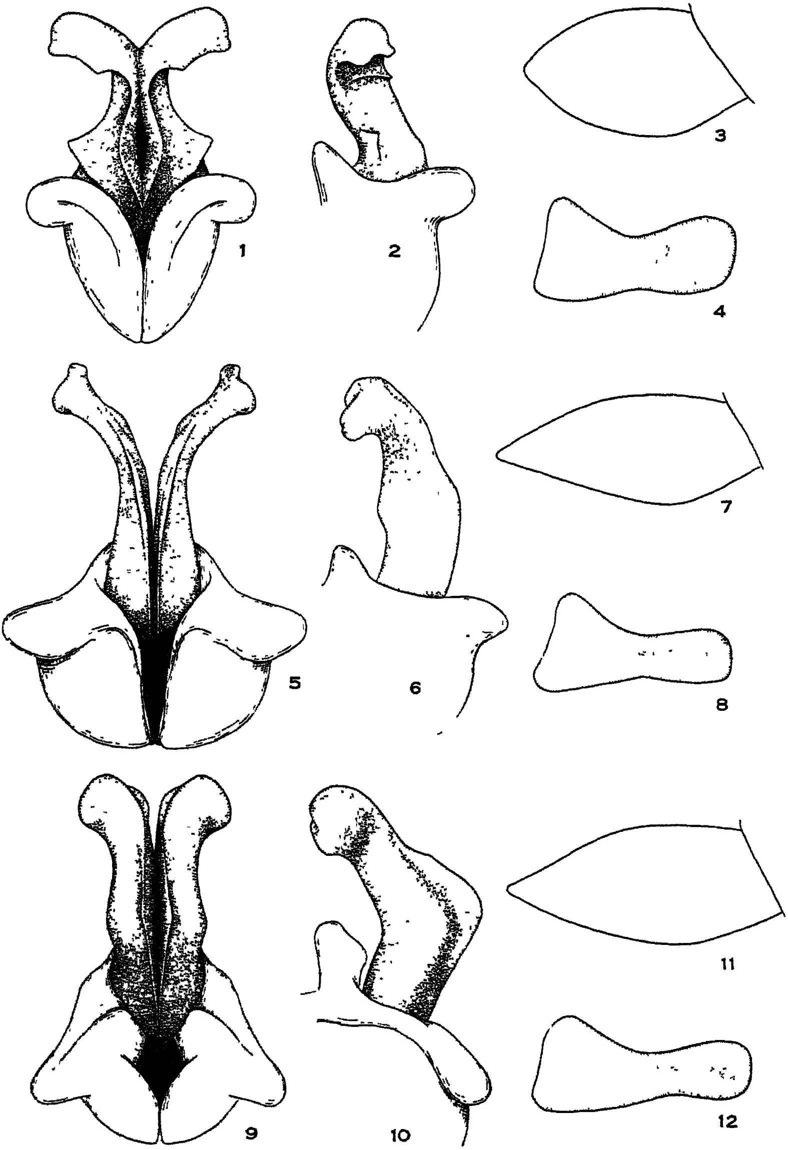
Except for the male terminalia, the average larger size, and darker general coloration, this subspecies closely resembles *M. p. cameronis.* The distal portion of the male cercus is proportionately narrower and longer than the other subspecies (cf. figs. 12, 8 and 4). The aedeagus shows the greatest amount of differentiation. The exposed portion of the aedeagal valves are sharply bent cephalad near the mid point of their length (fig. 10).

Type.— ♂ ; Between Villa Juarez and 35 miles south, Tamaulipas, Mexico. Elevation 400-1000 ft. July 23, 1936. (H. R. Roberts.) [Acad. Nat. Sci. Phila., Type no. 5746.]

Specimens.—MEXICO: 6-10 miles north of Villa Juarez, Tamps., 400 ft., IX, 11, 1936, 4 ♀ (Roberts); same data as type, 11 ♂, 9 ♀; Tampico, Tamps., XII, 26, 1908, 1 ♂ ; 15 miles north of Valles, S. L. P., VIII, 1, 1938, 2 ♂ (Roberts).

---

[9] An allusion to its relatively tropical habitat.



Figs. 1-4, *Melanoplus plebejus plebejus* (Dallas, Texas); figs. 5-8, *Melanoplus plebejus cameronis* (type); figs. 9-12, *Melanoplus plebejus torridus* (type). Figs. 1, 5 and 9, caudal aspect of aedeagus; figs. 2, 6 and 10, left lateral aspect of aedeagus; figs. 3, 7 and 11, right tegminal pad, fig. 3 at slightly larger scale than other two figures; figs. 4, 8 and 12. left cercus.

NOTULAE NATURAE

NUMBER 189 OF MARCH 14, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE BULL-EYE (COOKEOLUS BOOPS) FROM OFF THE NEW JERSEY COAST

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

The interesting fish here reported is the first of this species to be found off the New Jersey coast, thereby adding a second species from that area to the family of Catalufas, or Priacanthidae, to which it belongs. Owing to its striking and brilliant colors, together with enlarged fin development, it is one of the most attractive and beautiful of tropical fishes. The greatly enlarged ventral fins, another outstanding characteristic, led me to propose for it in 1928 the subgeneric name *Cookeolus,* in the genus *Priacanthus,* in honor of my friend Dr. Charles Montague Cooke, of Honolulu. *Cookeolus* is here elevated to generic rank. The Academy is indebted to Mr. Carroll B. Atkinson, of Ventnor, N. J., who procured the specimens for our collection.

Genus **COOKEOLUS** Fowler

Cookeolus Fowler, Mem. B. P. Bishop Mus., vol 10, 1928, p. 190. Type *Anthias boops* Schneider, orthotypic

Cookeolus boops (Schneider) Bull-eye. Figure I.

Anthias boops Schneider, Syst. Ichth. Bloch, 1801, p. 308 (type locality, Atlantic Ocean near St Helena) (from Forster).

Perca boops Forster, in Schneider, op cit, p. 308 (name in synonymy).

Priacanthus boops Devincenzi, Anal. Mus. Nac. Montevideo, ser. 2, vol. 2, 1924, p. 226 (on Cuvier).—Barnard. Ann South African Mus., vol. 21, pt. 2, 1927, p. 500 (Cape of Good Hope).—Fowler, Bull. Amer. Mus. Nat. Hist., vol. 70, pt. 2, 1936, p. 784, fig. 345 (from Valenciennes) (description from Boulenger)

Priacanthus bonariensis Cuvier, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 3, 1829, p. (78) 105 (type locality, Buenos Ayres, Argentina).—Reid, Copeia, 1944, no. 4, p 215, pl. 1 (from 80 miles southeast of Cape Henry in Virginia, in 100 to 150 fathoms).

Depth $2\frac{1}{4}$; head $2\frac{4}{5}$, width 2. Snout 4 in head measured from snout, which is level with the middle of the eye; eye $2\frac{1}{2}$, greatly exceeds snout or interorbital; maxillary reaches opposite front edge of pupil, its hind expansion $1\frac{3}{4}$ in eye, length $1\frac{9}{10}$ in head measured from snout tip; mouth subvertical, with closed lower jaw strongly protruded in front; teeth in jaws in rather narrow bands, villiform, and the bands narrowing posteriorly in each jaw; narrow strip of villiform teeth on vomer and on each palatine; preorbital finely denticulate along both orbital and lower edges; posterior nostril large vertical aperture, about $\frac{7}{8}$ diameter of pupil; opercular spine $2\frac{2}{3}$ in orbit. Gill rakers 7 + 1 + 16, lanceolate, longer than gill filaments or slightly over half of orbit.

Scales 75 + 7 counted close along above lateral line; tubular scales 55 + 3 in lateral line; 12 scales above lateral line to edge of basal scaly sheath of spinous dorsal fin; 31 scales above spinous anal origin to lateral line; 12 scales in vertical series on cheek from lower edge of lateral line to preopercle ridge; about 35 predorsal scales; 21 scales between pectoral and ventral bases. Smallest scales on muzzle above, on predorsal and front of back. Scales all small and reduced on chest, breast and belly.

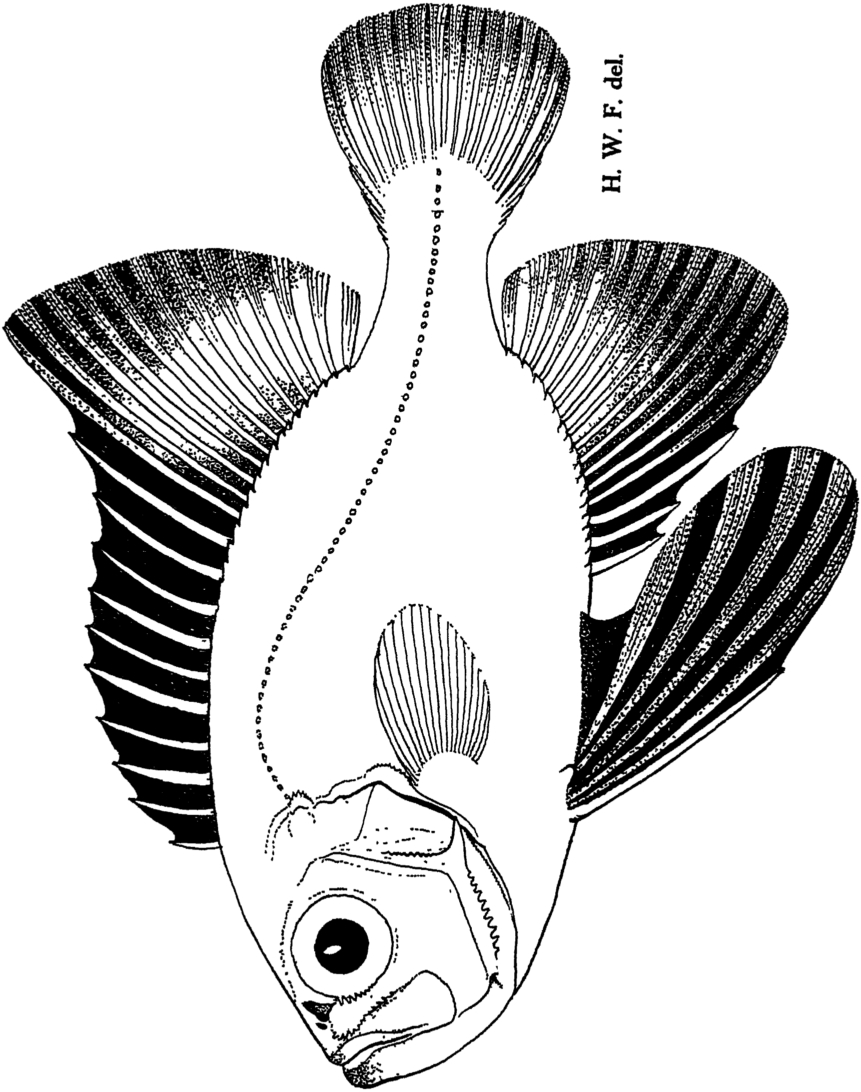
D. X, 12, I, first spine 2 in eye, tenth 2 in total head length, first dorsal ray $1\frac{1}{10}$; A. III, 13, I, third spine $1\frac{5}{6}$, second ray $1\frac{1}{6}$; least depth of caudal peduncle $3\frac{2}{3}$; caudal $1\frac{2}{3}$, convex behind; pectoral $1\frac{7}{8}$, rays II, 16; ventral I, 5, spine $1\frac{2}{7}$ in total head length, when depressed hind tip of fin reaches base of fourth anal ray.

Color when freshly placed in alcohol deep rose red, to slightly light rose below. Iris and flexures of mouth bright scarlet. Upper surface of head more or less diffused with scarlet. Back tinged with olivaceous above lateral line. Spinous dorsal membranes black, and same color terminally on middle of second dorsal, becoming pink posteriorly on fin. Middle of second dorsal bright scarlet, though this area narrowing posteriorly on fin as it shortens. All spines and rays bright rose. Anals like dorsals. Caudal brilliant vermilion basally, subterminally orange red and hind border rather narrowly blackish gray, inner line of demarcation diffuse. Pectoral rose, pale or grayish terminally. Ventral with broad black membrane, spine and rays rose.

Length 178 mm. From about 40 miles southeast of Five Fathom Bank, off Cape May County, N. J. January 8, 1947. Carroll B. Atkinson.

This specimen was found in a large catch of porgies (*Stenotomus chrysops*), its bright and conspicuous colors among the mass of fish attracting the attention of the fishermen. The history of the species is interesting and its distribution in the Atlantic is reflected in the references cited above. It appears to have been first named by J. R. Forster as the Bull-eye or *Perca boops*, the last a name appropriated and validated by the copyist J. G. Schneider as *Anthias boops* in 1801. In South America it was described from Buenos Aires as *Priacanthus bonariensis* Cuvier, a name used by Reid in reporting the only North American specimen, which was 170 mm. in total length, obtained from off Virginia.

Since the above was written, I have received a second specimen 187 mm., obtained from the trawler fleet, in the same locality, January 20, 1947.



H. W. F. del.

Fig. 1.—*Cookeolus boops* (Schneider).

NOTULAE NATURAE

NUMBER 190 OF MARCH 25, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NEW PEMPHILIDINE WASPS, WITH NOTES ON PREVIOUSLY DESCRIBED FORMS: III.* (HYMENOPTERA: SPHECIDAE)

BY V. S. L. PATE

Research Associate, Academy of Natural Sciences of Philadelphia

The present paper presents descriptions of three new wasps: two from Costa Rica and one from Venezuela. It gives me great pleasure to dedicate the first of these to Dr. Philip P. Calvert in recognition of his many contributions to our knowledge of the fauna of Costa Rica.

Euplilis (Euplilis) calverti new species Figs. 2, 5.

Like *grenadinus* from the Windward Island of Grenada, *calverti* has two large oval puberulent fossae posteriorly on the vertex. However, the conformation of the clypeus, the more weakly carinate pronotum, the depressed ocellar triangle, and the sordid colored scapes will differentiate *calverti* from that species.

Type.— ♂ ; Bonnefil Farm, Rio Surubres, Costa Rica. Elevation, 700 feet. October 16, 1909. (Philip P. Calvert.) [Academy of Natural Sciences of Philadelphia, Type no. 4188.]

Male. Length 4 mm. Fulgid black; the following stramineous: palpi; mandibles except red apices; base and apex of scape obscurely; pronotal tubercles; all of fore legs; middle legs including tips of coxae; hind coxae, bases of trochanters, and tibiae broadly annulate at base. Castaneous: hind legs exclusive of stramineous maculation; abdominal tergites. Testaceous: abdominal venter, and bases of third and fourth tergites with narrow bands. Light brunneous: antennal flagellum, pedicel, and middle of scapes. Tegulae and axillary sclerites light fulvous. Wings clear hyaline, iridescent; veins and stigma castaneous.

---

* I: Notulae Naturae, no. 171. II: Notulae Naturae, no. 185.

Head fulgid; clypeus with appressed silvery sericeous pile; remainder with a very thin vestiture of puberulent silvery hair. Front gently concave between inner orbits; upper front and vertex with fine, well-separated, setigerous punctures; ocelli arranged in an equilateral triangle, the triangle depressed, post-ocellar line one-half the ocellocular distance; behind each hind ocellus, just before the occipital carina, with a large oval fossa filled with erect puberulent hair; temples impunctate; occipital carina fine. Antennae with sockets subcontiguous to each other and also to nearest inner orbits; scapes ecarinate, elongate-subfusiform, one-half the vertical eye length; pedicel obterete, twice the length of first flagellar article; flagellum simple, not fringed beneath with hair, first segment three-fourths the length of second, the following segments subequal in length, last article simple, terete, twice the length of penult segment. Clypeus transversely sublenticular in shape, median length one-third the vertical eye length, gently arched transversely, closely punctate; apical margin with a short, squarely produced, truncate section medially, on each side of which margin is sinuous and ends in an acute lateral tooth. Mandibles with apices evenly bidentate; inner margins edentate.

Thorax fulgid; with a thin and scanty clothing of puberulent silvery hair. Pronotum situated below level of the arched mesonotum; dorsal surface flat, margined anteriorly by a weak carinule which is inconspicuously notched medially; humeri rounded; lateral margins rounded, ecarinate. Mesonotum, scutellum, and postscutellum simple, with very fine, well-separated, setigerous acupuncturation throughout; mesonotal-scutellar suture strongly impressed but efoveate. Mesopleura polite, impunctate; prepectus rounded anteriorly; mesopleural pit distinct; metapleura polite. Propodeum with dorsal face polite, glabrous, without trace of a trigonal enclosure, but bisected by a vestigial, fine, linear groove; posterior face impunctate, with a thin vestiture like mesonotum, bisected by an obpyriform impression; lateral carinae distinct along posterior face and simple below; lateral faces polite, impunctate, subglabrous.

Legs simple. All femora slender, fusiform; fore and hind tibiae slender, obterete; hind tibiae gently clavate apically, not appreciably spinose; longer hind tibial calcar one-half length of hind metatarsi which are subequal in length to four distal segments combined. All tarsi simple, very slender and elongate.

Fore wing with marginal cell three times as long as wide and broadly, obliquely truncate at apex; radius with first abscissa one-third the length of second, the third abscissa one-fifth length of second; transverse cubital vein oblique, inclivous, one-half length of second abscissa of cubitus which is equal in length to first abscissa.

Abdomen polite, impunctate; with a very thin and inconspicuous vestiture of puberulent silvery hair. First segment very slender and elongate, nodose at apex; rest of abdomen elongate-fusiform. Last tergite without a pygidial area. Sternites convex, simple and unmodified.

Female. Unknown.

In addition to the type, I have examined a topotypic male paratype which agrees with the type in all essentials of livery and structural detail.

Euplilis (Euplilis) tristani[1] new species Fig. 4.

The fulgid habitus, fringed antennal flagellum, yellow clypeus, and greatly swollen hind tibiae distinguish *tristani* from all other described Middle American forms of *Euplilis*.

Type.—♂; San José, Costa Rica. Elevation, 3800 feet. May, 1923. (J. Fidel Tristán.) [Academy of Natural Sciences of Philadelphia, Type no. 4189.]

Male. Length 4.5 mm. Fulgid black; the following stramineous: palpi; mandibles save red apices; clypeus; scapes, pedicel; pronotal tubercles; propleura and lower margin of pronotum; all of fore and middle legs except femora which are slightly tinged with fulvous; hind coxae and trochanters beneath, hind tibiae broadly annulate at base. Hind legs brunneous save for stramineous maculation and a large distal oval badeous spot on inner faces. Abdominal tergites brunneous, the bases of third and fourth tergites testaceous; venter testaceous from third segment to apex. Tegulae and axillary sclerites brunneous. Wings clear hyaline, iridescent; veins and stigma dark brunneous.

Head subfulgid; clypeus, lower temples, and gular region, with appressed silvery sericeous pile. Front very narrow, almost flat; upper front and vertex impunctate, subglabrous, with a microscopic cancellate sculpture, bisected anteriorly by a moderate impression running forward from anterior ocellus; ocelli arranged in an equilateral triangle, postocellar line three-fifths the ocellocular distance; vertex simple posteriorly, without pubescent fossae; occipital carina fine; temples impunctate. Antennae with sockets contiguous to each other and also to near inner lower orbit; scapes elongate-cylindrical, very slender, ecarinate, almost two-thirds (0.643) the vertical eye length; pedicel simple, obterete, one and a third times the length of first flagellar article; flagellum simple, the segments subequal in length, and with a fringe of hair beneath, last article simple, terete, twice the length of penult segment. Clypeus subtrapeziform, with median length one-fourth the vertical eye length; gently arched transversely; apical margin briefly truncate medially and arcuate laterally on each side. Mandibles with apices bidentate.

Thorax fulgid, impunctate; dorsally with a very thin and inconspicuous vestiture of silvery puberulent hair; prepectus and venter with rather dense, appressed, silvery sericeous pile, the mesopleura posteriorly, and metapleura glabrous. Pronotum, mesonotum, scutellum, and postscutellum with a microscopically fine cancellate sculpture. Pronotum short, situated somewhat below the level of the gently arched mesonotum; dorsal surface flat, not notched medially, anterior margin ecarinate, broadly rounded, as are also the humeri and lateral margins. Mesonotum, scutellum, and postscutellum simple; mesonotal-scutellar suture deeply impressed but efoveate. Mesopleura with prepectus rounded anteriorly; episternal suture strongly impressed; surface polite posteriorly; mesopleural pit faint. Metapleura polite. Propodeum fulgid, impunctate; both dorsal and posterior faces laterally with a thin vestiture of appressed silvery puberulent hair; dorsal face with a polite, glabrous trigonal area medially (not delimited, however, by furrows or carinules) and bisected by a very faint, vestigial, linear furrow; posterior face bisected by a faint impression; lateral carinae fine, present along lower two-thirds of posterior face; lateral faces polite, glabrous.

---

[1] Dedicated to the memory of Prof. J. Fidel Tristán, late Director of the Museo Nacional de Costa Rica, an inspiring teacher and a distinguished investigator.

Legs simple. All femora fusiform; fore and middle tibiae slender, elongate-obterete; hind tibiae very slender on basal fourth, the remainder very strongly, abruptly swollen and clavate, their outer faces weakly spinose. Longer hind tibial calcar one-half length of hind metatarsi. All tarsi simple, very slender and elongate.

Fore wing with marginal cell three times as long as wide and broadly, obliquely truncate at apex; radius with first abscissa two-fifths the length of second, the third abscissa one-third the length of second; transverse cubital vein oblique, inclivous, one-half the length of second abscissa of cubitus which is equal in length to first abscissa.

Abdomen polite, impunctate; with a very sparse vestiture of puberulent hair. First segment very slender, elongate, nodose at apex, polite, subglabrous; rest of abdomen fusiform, the tergites with very fine, inconspicuous, transverse aciculation. Last tergite without a pygidial area. Sternites simple, unmodified.

This distinctive little Costa Rican form is known from only the unique male described above.

Euplilis (Euplilis) diopura[2] new species Figs. 1, 3.

The red-tipped abdomen, the curiously shaped and bifossulate last abdominal tergite, and the structure of the hind tibiae distinguish *diopura* from all other described Central and northern South American forms of *Euplilis*.

Type.—♂; San Esteban, Estado Carabobo, Venezuela. September 26, 1937. [Academy of Natural Sciences of Philadelphia, Type no. 4190.]

Male. Length 5 mm. Black; head with obscure brassy-green reflections; following citrinous: palpi; mandibles except red apices; scapes; pronotal lobes; fore legs distad of coxae, and also middle legs but with femora tinged above with fulvous and with a brown longitudinal stripe; hind coxae at tips, trochanters, hind tibiae broadly annulate at base. Badeous: hind tibiae broadly banded at apex; abdomen: third and all following sternites, last two tergites entirely and bases of third and fourth. Antennal flagellum and pedicel, light brunneous. Tegulae and axillary sclerites fulvous. Wings clear hyaline; veins and stigma brunneous.

---

[2] < διωπουρα < δί, two + ὤψ, eye + οὐρα, tail: in allusion to the two shallow eyelike fossae on the last abdominal tergite.

Head subcuboidal; subfulgid; impunctate; clypeus with dense appressed silvery sericeous pile; vertex subglabrous; temples with a thin clothing of puberulent hair. Front, vertex and temples with a microscopically fine cancellate sculpture. Front weakly concave; upper front bisected by a very faint impression running forward from anterior ocellus; ocelli in an equilateral triangle, the postocellar line two-thirds the ocellocular distance; occipital carina fine. Antennae with sockets contiguous to each other and also to nearest lower inner orbit; scapes slender, elongate-cylindrical, ecarinate, six-tenths the vertical eye length; pedicel obterete, twice the length of first flagellar article; flagellum simple, not fringed beneath with hair, the segments subequal in length, last segment simple, terete, twice the length of penult article. Clypeus subtrapeziform, gently arched transversely, median length one-fourth the vertical eye length; apical margin subtruncate and beaded medially and sinuate laterally on each side. Mandibles with apices bidentate.

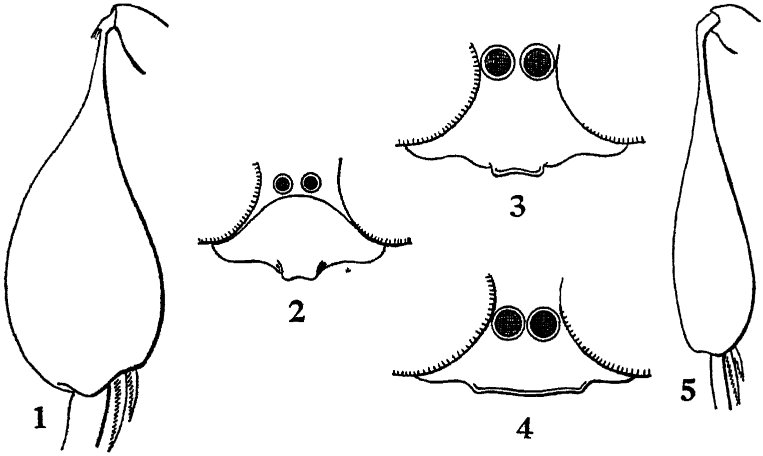
Thorax subfulgid to subopaque; impunctate but with a microscopically fine cancellate sculpture throughout; dorsally with a thin and inconspicuous vestiture of puberulent hair; prepectus, mesopleura posteriorly (the disc glabrous), and mesosternum with rather dense, appressed silvery sericeous pile. Pronotum rather long, situated below level of arched mesonotum; dorsal face flat, bisected by a very narrow, linear, weak furrow; anterior and lateral margins ecarinate, rounded; humeri broadly rounded. Mesonotum, scutellum, and postscutellum simple, microscopically coriaceous and opaque; mesonotal-scutellar suture deeply impressed but efoveate. Mesopleura with prepectus rounded anteriorly; episternal suture impressed; mesopleural pit faint. Propodeum subfulgid, with fine cancellate sculpture throughout like vertex and thorax; posterior face, and dorsal face laterally, with a moderate clothing of decumbent silvery pubescence; dorsal face with a trigonal enclosure defined by a finely foveolate groove, opaque and finely granulose within, anterior margin foveolate, bisected by a weak, linear impression; posterior face cleft by a deep impression; lateral carinae present along posterior faces; lateral faces glabrous.

Legs relatively simple. All femora fusiform, the fore pair somewhat swollen; front and middle tibiae elongate-obterete, the fore pair somewhat flattened beneath; hind tibiae very slender on basal fourth, the remainder very strongly swollen and clavate, the outer faces weakly spinose, and on inner face at base with a blunt, hirsute, spinoid tubercle. Longer hind tibial calcar one-half length of hind metatarsi.

Fore wings with marginal cell three times as long as wide and broadly, obliquely truncate at apex; radius with first abscissa almost six-tenths (0.59) the length of second, the third abscissa one-third the length of second; transverse cubital vein oblique, inclivous, one-half the length of second abscissa of cubitus which is four-fifths the length of first cubital abscissa.

Abdomen perfulgid, impunctate; tergites subglabrous; third and following sternites villous. First segment elongate, petiolate, nodose at apex; rest of abdomen fusiform. Second to fourth tergites with very fine, microscopic, transverse aciculation; fifth and sixth polite; seventh (last) hood shaped, without a pygidial area, transversely concave medially, latero-anteriorly on each side with a large, flat, shallow fossula which is margined anteriorly and laterally. Sternites simple.

This Venezuelan form is known only from the unique male described above.



Euplilis diopura new species. Fig. 1.—Lateral aspect of hind femora. Fig. 3.—Anterior aspect of clypeal region.

Euplilis calverti new species. Fig. 2.—Anterior aspect of clypeal region. Fig. 5.—Lateral aspect of hind femora.

Euplilis tristani new species. Fig. 4.—Anterior aspect of clypeal region. (All figures drawn to same scale.)

NOTULAE NATURAE

NUMBER 191 OF MARCH 28, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

DESCRIPTION OF A NEW SPECIES AND GENUS OF DARTER FROM THE CAPE FEAR RIVER BASIN OF NORTH CAROLINA

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

During a trip through the Carolinas, Georgia and Florida in October of 1946, I collected the interesting little darter (*Percidae*) here described from the headwaters of the Cape Fear River of North Carolina.

BELOPHLOX new genus

Type.—*Belophlox mariae* new species.

Body moderately long. Head moderate. Teeth in rather broad villiform bands in the jaws and on vomer and palatines. Head naked, except upper posterior part. A narrow naked strip in the middle of the scaly predorsal. Chest and breast naked. Belly scaled. Scales large, less than 40 in lateral line. Only small scales on predorsal, prepectoral base and caudal base. Two dorsals connected, first dorsal with 11 spines, lower than soft dorsal. Anal with 2 spines. Fins all more or less brilliant red.

A genus with large scales and in that respect in agreement with *Boleosoma*, though in most other details it is quite different. Thus the largely naked head, chest and breast, the continuous dorsal fins and very distinctive coloration, especially the red fins and greatly contrasted color pattern are outstanding.

(βέλος dart + φλόξ flame, with reference to the red fins.)

Belophlox mariae new species Figure I.

Depth $4\frac{1}{10}$; head $2\frac{2}{5}$, width $1\frac{3}{7}$ in its length. Snout $3\frac{1}{3}$ in head, its tip level with lower edge of eye; eye 4 in head, close to and nearly reaches upper profile of head; mouth terminal, moderate; maxillary reaches back below first $\frac{1}{4}$ in eye, expansion about as wide as preorbital; closed jaws with lower slightly shorter; teeth villiform, fine, pointed, in rather broad bands in jaws, few on vomer and band on each palatine; bony interorbital about half diameter of eye, level. Opercle with single strong spine. Gill opening extends forward about opposite hind vertical edge of preopercle. Gill rakers 2 + 6, short, blunt, rather robust; $\frac{1}{3}$ of gill filaments, which are $\frac{1}{2}$ of eye.

Scales 37 in lateral line to caudal base, its course straight; 4 scales above lateral line to second dorsal origin, 6 below to anal origin; 13 predorsal scales. Head other than noted, chest and breast to ventral fins, naked. Patch of few small scales at prepectoral base. Caudal basally covered with small scales

D. XI, 12 I, first spine 4 in head, fourth spine $2\frac{1}{3}$, fourth ray $1\frac{1}{2}$; A. II, 9; first spine $3\frac{1}{2}$, third ray $1\frac{7}{8}$; least depth of caudal peduncle $2\frac{1}{10}$; caudal $1\frac{1}{3}$, convex behind; pectoral $1\frac{1}{8}$, rays 14; ventral rays I, 5, spine $3\frac{1}{4}$ in fin which is $1\frac{1}{4}$ in head.

Color when freshly caught with back and upper half of head and body slate brown, each scale with a darker center. Line of demarcation from color of back and that of under surface very distinct and contrasted. Under surfaces of body pale buff white, slightly flushed with pink and along sides of body, and on under surface of head, some few scattered dark to blackish spots. Several black bars on side of head, as a dark preocular bar, another postocular bar and as black line down from eye over cheek, and black arc along preopercle ridge. Iris dark gray, with diffuse black blotch above. All fins bright red. Spinous dorsal with upper diffuse dark gray submarginal band, edge of fin narrowly gray white. Soft dorsal and anal, and caudal, with small pale blue rounded spots of rays. Edges and slight submargin of vertical fins pale, less brilliant than rest of fins.

A.N.S.P., no. 71731. Tributary outlet of Watson's Lake near Southern Pines, in eastern Moore County, North Carolina. October 12, 1946. Henry W. Fowler. Length 70 mm.

I caught this active little darter in a cluster of *Potomogeton*, in clear cold water, flowing over light sandy bottom. When taken from the water the fish glowed in the strong contrast of its brilliant though dark colors. No other fishes were found in the vicinity.

The accompanying figure was drawn from the type, the median cut depicts a lateral view, the upper left cut a view of the head and predorsal region from above, and the lower left cut a view of the head and breast as seen from below.

(Named for Mrs. Emlen P. Darlington, my generous sponsor whose kindly interest has made possible the discovery of this interesting little fish.)

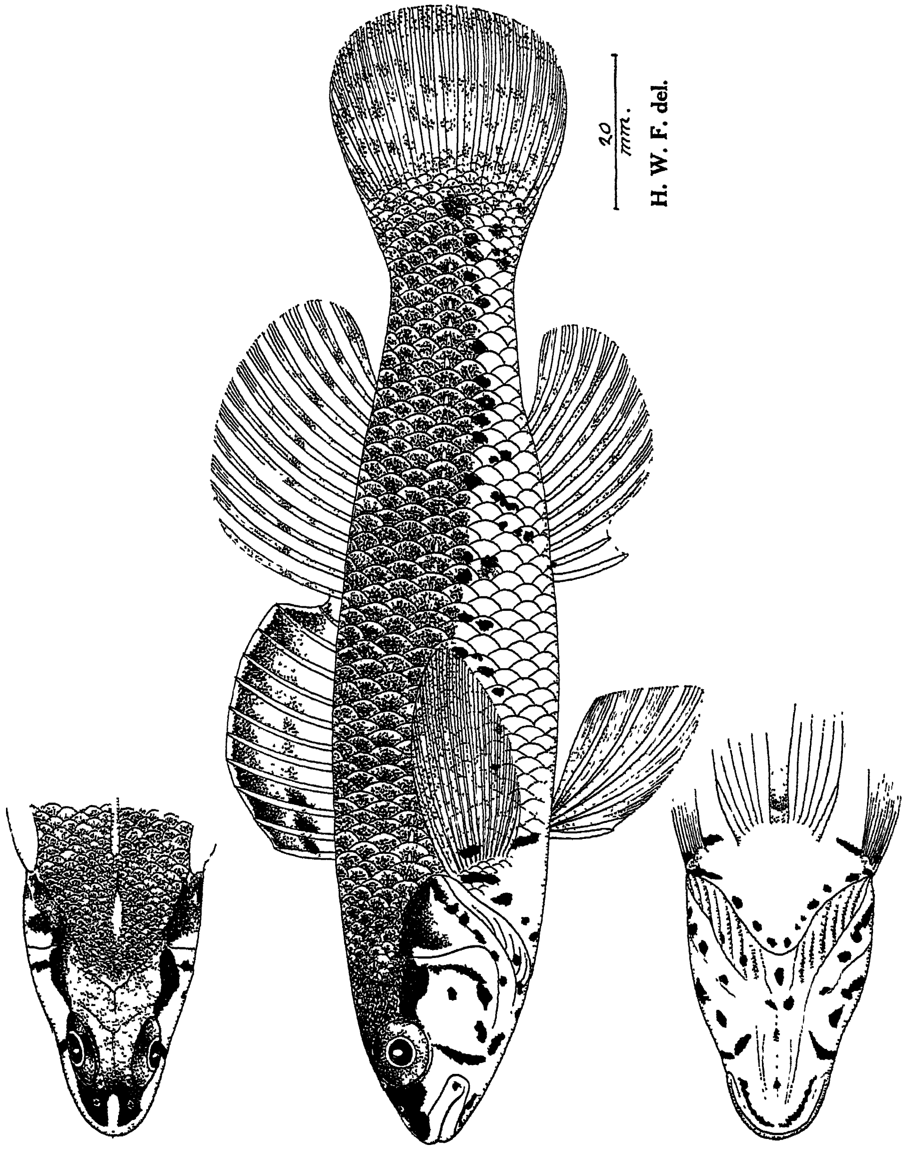

20 mm.
H. W. F. del.

Figure 1.—*Belophlox mariae* new species.

NOTULAE NATURAE

NUMBER 192 OF APRIL 9, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW GENUS AND SPECIES OF NOCTURNAL WASPS (HYMENOPTERA: MUTILLIDAE: CHYPHOTINI)

BY V. S. L. PATE

Research Associate, Academy of Natural Sciences of Philadelphia

The North American Mutillidae fall into two sharp and clearly defined groups: the Chyphotini which have the male hypopygium unciform and the hind wing provided with a large and distinct anal lobe and several fully closed cells; and the Mutillinae, in which the male hypopygium is non-unciform and the hind wing lacks both an anal lobe and fully closed cells. Hitherto only two genera of chyphotines have been known: *Chyphotes* Blake and *Typhoctes* Ashmead. To these may now be added the following strange and curious little wasp.

The material described below was collected by the personnel of the Southwest Orthoptera Survey of 1937, an expedition of the Academy of Natural Sciences of Philadelphia, financed by a grant from the Johnson Fund of the American Philosophical Society, and by the members of the survey. To the former I wish to express here my appreciation for their help which made possible this survey.

PITANTA[1] new genus

The greatly reduced venation of the fore wing which is very narrow and so short that it barely reaches the apex of the first abdominal segment, readily differentiates *Pitanta* from *Chyphotes* and *Typhoctes*, both of which have two or three submarginal and one or two discoidal cells in the fore wing which in each of these genera attains at least the hind margin of the third abdominal tergite. In adition to these alar features, *Pitanta* lacks pulvilli between the tarsal claws, and both the mesosternum and metasternum are simple, devoid of transverse carinae, of tubercles overlapping, or of teeth before, either the middle or hind coxae, whereas in *Chyphotes* and *Typhoctes* the mesosternum is usually provided with a transverse carina before the middle coxae, and both the mesosternum and metasternum are generally armed with teeth or tubercles before the middle and hind coxae. Furthermore, both genera have a distinct pulvillus (occasionally rather small) between the tarsal claws.

---

[1] *Pitanta:* the Chemehuevi name for the Vanyume Indians who formerly inhabited the area of the Mojave Desert stretching from the San Bernardino Mountains northward to beyond Barstow and Daggett.

Generic Features.—Slender, elongate, finely sculptured, moderately hirsute, nocturnal forms. Head transversely suboval in dorsal aspect, subcircular in anterior aspect, and wider than thorax. Eyes large, prominent. hemispherical, very finely and indistinctly facetted, black; inner orbits entire; posterior orbits shallowly sinuate below. Ocelli moderately enlarged; ocellocular line distinctly longer than postocellar distance. Occipital carina distinct though fine, but incomplete, not a complete circle in extent nor attaining hypostomal carinule bordering oral fossa. Antennae thirteen-segmented, elongate, slender, extending back almost to end of propodeum; antennal sockets with upper and inner margins strongly flanged and projecting over bulb of scapes. Clypeus simple. Maxillary palpi six-segmented, very slender, elongate, extending back to apex of fore coxae; labial palpi four-segmented, slender, elongate. Mandibles slender, falcate; apices acuminate; inner margins with a small apical tooth; lower margins simple, entire.

Thorax slender, elongate, more coarsely sculptured than head or abdomen. Mesonotum with parapsidal furrows evident on posterior half; scutellum and post-scutellum strongly tumid. Mesopleura without sutures or epicnemia; posteroventrally with a small marginate scale projecting over bases of middle coxae. Metapleura reduced to a small trigonal dorsal sclerite. Mesosternum bisected for its entire length by a strong furrow, but without a transverse ridge, carina, teeth or tubercles before, or laminate plates overlying bases of, the widely separated middle coxae. Metasternum bisected by a strong laminate carina, but no teeth, tubercles, or mammilate processes before or between the contiguous hind coxae. Propodeum simple, undifferentiated, hood-shaped; very elongate, one-half the length of the alitrunk; gently, arcuately declivous posteriorly.

Legs very slender and elongate. Femora and tibiae slender, subcylindrical; both with erect setulae, the latter not spinose. Tibial calcaria 1-2-2. Pulvillus absent between the simple tarsal claws.

Wings narrow, short; the membrane heavily ciliate; fore wings with anterior margin, costa, subcosta, stigma, median and radial veins rather heavily setose. Fore wings not quite attaining the apex of petiolate first abdominal segment; marginal cell short, subovate; stigma distinct though diffuse apically; one incomplete submarginal cell, the cubitus obsolete basally; first and third transverse cubital veins obsolete; no closed discoidal cells; basal vein strongly sigmoid and arising slightly beyond the transverse median vein. Hind wing with costa present only at base; with a closed median and submedian cell, the latter sublanceolate; cubitus arising distinctly beyond the transverse median vein. Anal lobe elongate oval, as long as submedian cell. Posterior margin of hind wing and anal lobe heavily ciliate.

Abdomen petiolate, slender, about one and two-thirds as long as alitrunk. First segment very slender, elongate, gently clavate apically, three times as long as wide at apex where it is separated from remainder of fusiform abdomen by a very strong constriction; the tergite firmly ankylosed with sternite and occupying almost the posterior three-fifths of dorsal surface. Second tergite with a felt line on each side near lateral margin. Second sternite bisected by a very weak line on anterior half. Last tergite simple, without a pygidial area. Hypopygium of male unciform. Female sex unknown.

GENOTYPE.—*Pitanta mojave* new species.

This genus comprehends at present the following species of which only the male sex is known.

Pitanta mojave[2] new species Fig. I.

The characters presented in the introductory discussion of the genus for separating *Pitanta* from *Chyphotes* and *Typhoctes* will likewise serve to differentiate *mojave* from all other chyphotine wasps.

Type.— ♂ ; Mojave Desert, a few miles west of Hinkley, San Bernardino County, California. Elevation, 2275 feet. August 1, 1937. (V. S. L. Pate; at light, at night.) [Academy of Natural Sciences of Philadelphia, Type no. 10601.]

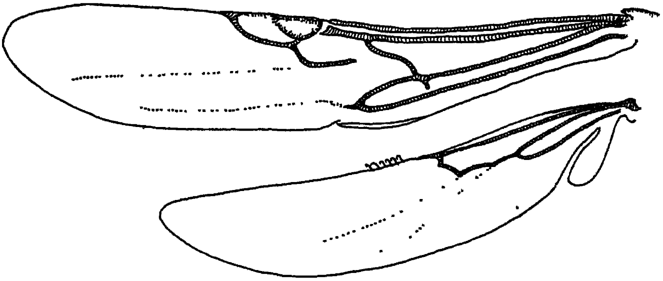


FIG. 1. Fore and hind wings of *Pitanta mojave*.

---

[2] After the Mojave Desert in southern California where the type of this species was collected.

Male. Length 8.5 mm. Very pale stramineofulvous throughout; second abdominal tergite bisected by a castaneous stripe; first abdominal sternite badeous medially; mandibles with apices red. Ocelli with a small brunneous lunate vitta along inner margins. Wings clear hyaline; veins and stigma light fulvous.

Head fulgid; with a very sparse clothing of erect, fine setulae; with a fine cancellate sculpture throughout upon which is superposed a series of very scattered setigerous punctures. Eyes polite; inner orbits entire, straight to gently convex. Front convex, bisected by a fine impressed line from anterior ocellus. Ocelli subcircular and, although enlarged, with their longer diameter not more than one-half the length of postocellar distance; postocellar line two-thirds the ocellocular distance. Antennae with scapes cylindrical, subequal in length to vertical eye length; pedicel obterete; flagellum cylindrical, filiform to tapering at apex; relative lengths: scape 20; pedicel 8; flagellar segment one 24, two 24, three 21, four 20, five 15, six 13, seven 11, eight 10, nine 8, ten 7, eleven 10; interantennal line three-fifths the antennocular distance. Clypeus with median length one-half the vertical eye length; lateral areas flat to concave; disc very strongly tumid; median lobe with apical margin truncate to obscurely retuse medially.

Thorax with a very thin vestiture of erect setulae; propleura with a tuft of white hair laterally below; with shallow, alveolate sculpture throughout. Propodeum evenly rounded; with shallow alveolate to areolate sculpture throughout, and with a clothing of setulae similar to thorax.

Legs clothed with long decumbent light hair and erect light setulae. Longer calcar of hind tibiae almost one-third length of hind metatarsi.

Abdomen with a moderate vestiture of erect setulae throughout, and with a very fine cancellate sculpture upon which is superposed a series of very scattered setigerous punctures; first sternite weakly alveolate rugulose. Petiolate first segment almost three-fourths (0.74) as long as remainder of abdomen which is subequal in length to alitrunk; first segment gently ampliate toward apex, width at widest part (a little before apex) one-third that of length, and separated at apex by a strong constriction from remainder of the slender, elongate fusiform abdomen. Hypopygium unciform.

This distinctive little nocturnal form is known only from the unique male described above.

NOTULAE NATURAE

NUMBER 193 OF APRIL 25, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW GENUS AND SPECIES OF CURCULIONIDAE (COLEOPTERA) IN BALTIC AMBER

BY TITUS ULKE

Washington, D. C.

I am unable to place the species here described in any of the known genera, and am therefore characterizing it as a new genus and species, i.e., *Paleopissodes weigangae.* It was found imbedded in thick brownish-red Baltic amber, 90 feet below the surface, in an amber mine at Palmnicken, East Prussia, in blue clay of the Lower Oligocene period, which has been estimated by Lord Raleigh to be some eight and a half million years old.

PALEOPISSODES new genus

Genotype of moderate size (10 mm. length over all) and evidently subcortical in habit. Probably infested coniferous trees and became entangled in resin, which, in time, changed to amber (Succinite).

Distinguishing characters.—The proboscis of the new genus is slender, thus approximating the beaks of recent members of the genus *Pissodes*, but is not like the proboscis of any of the fossil forms of that genus listed in Handlirsch (cited later), nor of the other genera of the tribe Hylobini (including genus *Hylobius*), with their thick beaks. It slopes at an angle of about 30° (from a horizontal line parallel with the longitudinal axis of the beetle), thus distinguishing it from existing *Pissodes strobi* Peck, in which this angular slope is about 60°, and from fossil *Pissodes planatus* Forst., which has the corresponding angle about 90°, and very probably from fossil *Pissodes effossus* Heyd. At the base of the proboscis, on the head, are the transversely and forwardly placed eyes.

Ventral segments six in number; the first of these segments occupying about half the length of the abdomen; the remaining five all have about the same length, excepting the last segment which is slightly longer. The sutures are straight, and the pygidium is covered by the elytra.

The front and middle coxae are round, those of the prosternum are contiguous, while those of the mesosternum are slightly separated. The hind coxae are elongated and located about as far apart as half the length of the coxa.

The elytra appear to be uniformly dark brown in color, but are less uniformly colored under magnification, which discloses, on each wing cover, what appear to be seven or eight longitudinally parallel, flat or tuberculate, brown or grayish ridges, between which are narrow grooves. The elytra are without either lighter areas or knobby processes on their rear portions, as are characteristic features of *Pissodes strobi.*

The tiny mandibles seem to have two apical teeth, which would place this new genus in the Tribe Hylobini, though the eyes are not contiguous beneath. The antennae are geniculate; scape long, but shorter than the funiculus, which is seven-jointed, with its club oval, pointed and annulated. The legs are stout and strong; tibiae thick and club shaped, with the posterior tibiae, at least, provided with minute serrations or spines on their outer margins, and with articular face lateral. The tarsi have four (three) joints, and simple, divergent claws.

Genotype.—Paleopissodes weigangae new species.

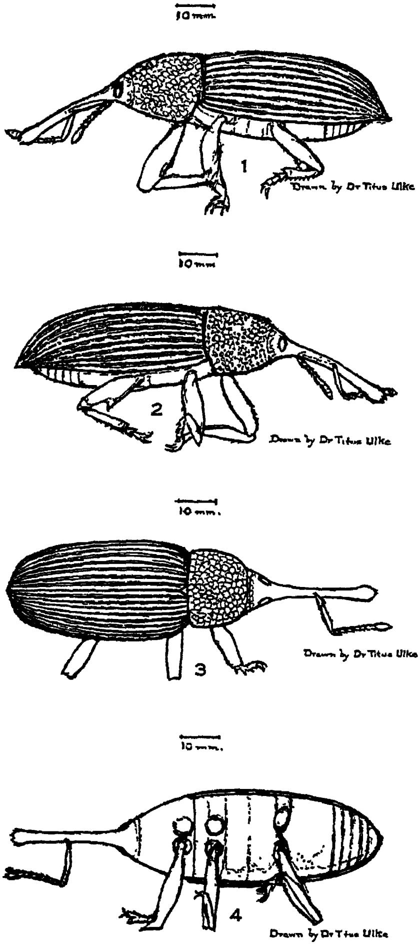
Paleopissodes weigangae new species Figs. 1-10.

Specific Characteristics

Total length	10	mm
Greatest breadth	2.5	mm.
Greatest height	2.3	mm.
Length of head with proboscis (approximately)	3.5	mm.
Width of proboscis (approximately)	0.25	mm.
Length of scape of the antennae	1.3	mm
Length of seven-jointed funicle with its club	1.6	mm
Length of head without proboscis (approximately)	0.6	mm.
Length of thorax, which is minutely tuberculate (approximately)	1.8	mm.
Anterior width of thorax	1.2	mm
Posterior width of thorax (approximately)	2.0	mm.
Length of elytra	5.0	mm.
Length of prosternum (approximately)	1.5	mm.
Length of mesosternum (approximately)	0.8	mm
Length of metasternum (approximately)	1.5	mm
Prosternal coxae, proximately touching, round, their diameter being	0.5	mm.
Metasternal coxae, separated by narrow gap, round, their diameter being	0.5	mm.
Posterior coxae, separated by gap of 0.3 mm., elongated, length approximately	0.7	mm.
Aggregate length of ventral segments (approximately)	2.9	mm.
Length of first segment (approximately)	1.5	mm
Length of second, third, fourth, fifth segments, each	0.25	mm
Length of last (sixth) segment (approximately)	0.4	mm
Length of front femur	2.3	mm.
Length of front tibia (approximately)	1.5	mm.

Type.—Palmnicken, East Prussia. Imbedded in amber. (Mrs. Bruno Weigang.) [Academy of Natural Sciences of Philadelphia, Type no. 8254.]

Comparisons.—While the above-described fossil beetle resembles the now existing White Pine Weevil (*Pissodes strobi* Peck) in general structure, it differs therefrom in color, being a uniform dark brown, made up of minute lighter and darker spots uniformly distributed in lengthwise parallel lines


10 mm.
1
Drawn by Dr Titus Ulke
10 mm
2
Drawn by Dr Titus Ulke
10 mm.
3
Drawn by Dr Titus Ulke
10 mm.
4
Drawn by Dr Titus Ulke

FIGS. 1 to 4.—Right side, left side, dorsal and ventral views respectively of *Paleopissodes weigangae* new species. (X 10.) Drawn by the author.

on the elytra, as against the chestnut or russet-brown color of *P. strobi*, whose wing covers, on their hinder quarters, are each marked with a whitish-gray, obliquely placed, roughly rectangular area and very knobby processes, both absent in the present new species.

Mr. L. L. Buchanan, weevil authority at the United States National Museum, after careful studies of pertinent species in the National Museum collection, decided that this new beetle belonged to an unknown fossil genus, and that it possesses characters suggesting *Pissodes* and also *Hylobius*.

The author endorses this decision and in naming the new genus *Paleopissodes*, indicates it is a probable fossil ancestor of the living species of *Pissodes*.

In the standard authority on fossil insects, " Die Fossilen Insecten " by Anton Handlirsch, Leipzig, 1907, three references to related forms are found on pp. 819 and 820, to wit: 1. *Pissodes* sp. Berendt, Organ. Reste, I, p. 56, 1845. Baltic Amber. Lower Oligocene. 2. *Pissodes planatus* Forster, Abhandl. Geol. Specialk. Els., III, pp. 395, 563, t. 12. f. 8, 1891. Locality: Brunstatt, Alsace. Middle Oligocene 3. *Pissodes effossus Heyden*. Palaeont., V, p. 117, t. 23, f. 15, 1858. Locality: Sieblos, Bavaria. Middle Oligocene.

None of these references seems applicable to my new species for the following reasons: That of Berendt only notes the fact that two fossil species of *Pissodes* were then known, but fails to describe them, or even state where descriptions of them were published. The description of *P. planatus* gives Brunstatt, Alsace, as its habitat, but does not mention its occurrence in amber, nor that it was found in the Lower Oligocene formation. The original figure of this fossil beetle is shown in Fig. 5. It differs from my new species in being little more than half its size, 6 mm. long, as against 10 mm.. and in having a relatively longer and thicker proboscis and apparently

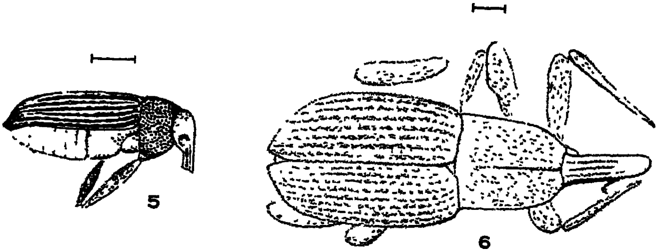
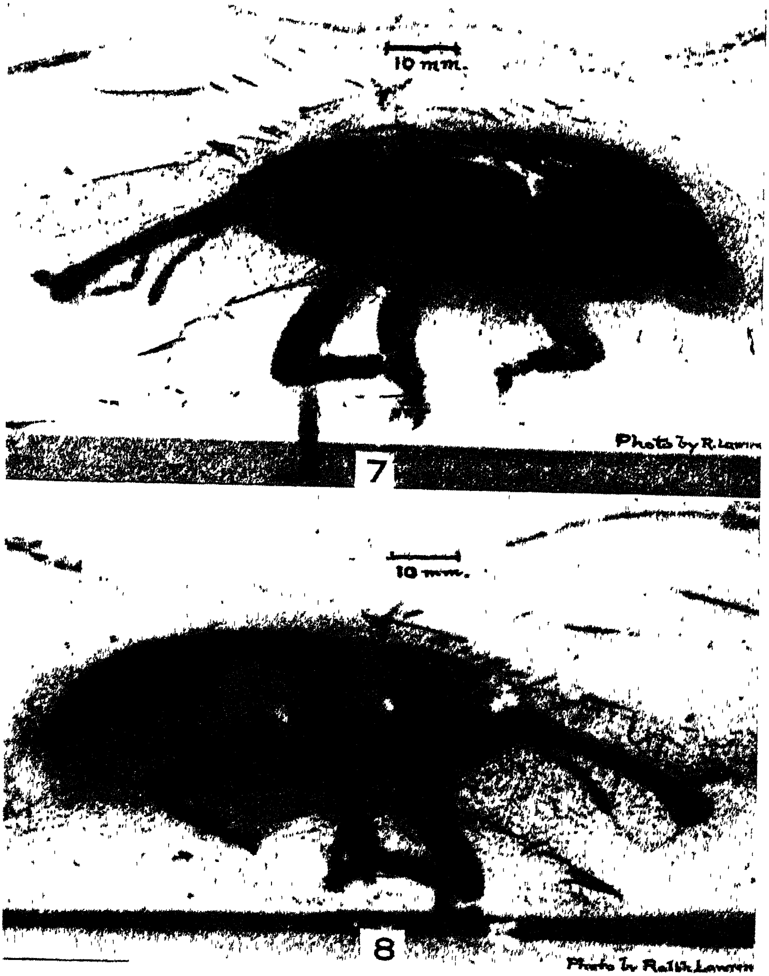


FIG 5—Side view of *Pissodes planatus* Förster. FIG. 6.—Dorsal view of *Pissodes effossus* Heyden. Photographs of the original illustrations. (Same size as originals.)

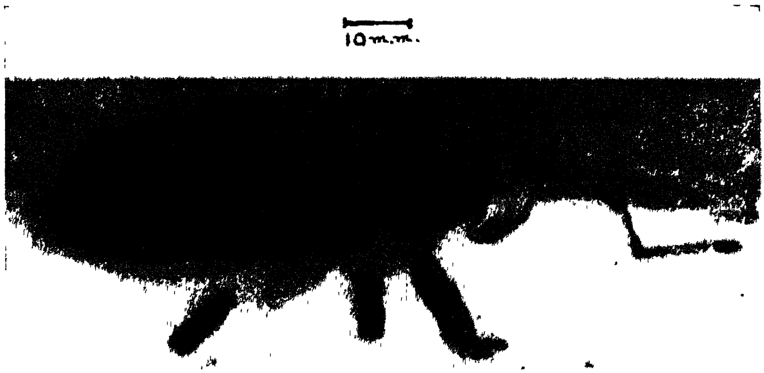
seven, instead of six, abdominal segments. Its color is given as uniformly rusty instead of dark brown. Heyden states in his description of *Pissodes effossus* that it was found in the Middle (and not the Lower) Oligocene formation, and evidently not in amber, at Sieblos, Bavaria. This fossil weevil is only 5 mm. long, or half as long as the new species here described, and has a relatively much longer thorax, as well as a relatively thicker beak. The entire surface of *P. effossus*, including its legs, is described as being rough with raised points, which is only partly the case with *Paleopissodes.* Unfortunately, comparisons of my species with other fossil weevils in the extensive German collections of Baltic amber beetles (now probably in Soviet control), cannot now be made, and specimens therefrom are not available in this country.

The European Spruce Weevil, *Hylobius abietis,* does not closely resemble the present new species either in form or sculpture, and possesss a much stouter beak.

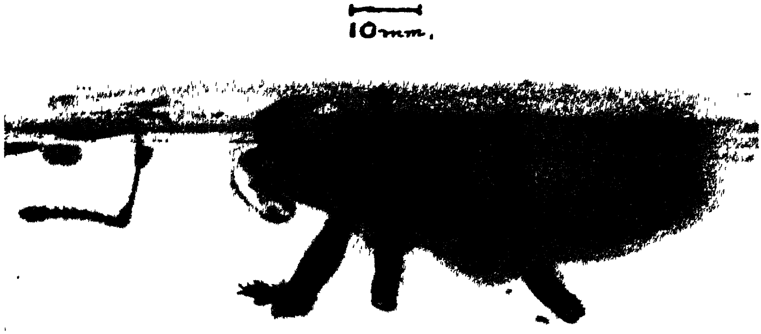
The author is very grateful to Mr. Buchanan for his work on this specimen, and to Mr. Ralph A. Lawrence for furnishing the excellent photographs of it. The specific name *weigangae* is given the new beetle in honor of my niece, Mrs. Bruno Weigang, of Konigsberg, now Kaliningrad, East Prussia, who found the unique weevil in some Baltic amber mined in 1939, and presented it to me.



Figs 7 and 8.—Views of the right and left sides of *Paleopissodes weigangae*. (× 10.)



9



10

FIGS. 9 and 10.—Dorsal and ventral aspects of *Paleopissodes weigangae*. (× 10.) Photographs by Mr. Ralph Lawrence

NOTULAE NATURAE

NUMBER 194 OF MAY 9, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

AESHNA PSILUS, A NEW SPECIES OF THE GROUP OF AE. CORNIGERA BRAUER (ODONATA: AESHNIDAE)

BY PHILIP P. CALVERT
Cheyney, Pennsylvania
Professor of Zoology Emeritus, University of Pennsylvania;
Research Fellow, Academy of Natural Sciences of Philadelphia

In their description[1] of *Aeshna manni,* new species, E. B. and J. H. Williamson wrote, "The males of *Aeshna cornigera* and *manni* are separated from all other described Aeshnas known to us by having the following combination of characters: . . . the anterior lamina of abdominal segment 2 [of the male] without distinctly developed spines", (pages 32, 33) and on an earlier page (30) they wrote of the male of *manni,* "Anterior lamina without distinct spines".

Thanks to Prof. F. M. Gaige, Director of the Museum at Ann Arbor, and Mrs. Leonora K. Gloyd of that institution, I have had the opportunity of examining some of the material studied by the Williamsons when writing their paper. It comprises the following specimens all bearing specific labels in, apparently, E. B. Williamson's handwriting as follows:

MEXICO: State of Jalisco, "*Ae. cornigera*", 1 ♂ 1 ♀; Chichen Itza, Yucatan, "*cornigera* (?)", 1 ♂; GUATEMALA: El Fiscal, "Ae. *cornigera*", 3 ♂. COLOMBIA: Santa Marta Mts., "near *cornigera* but not that species", 2 ♂. PERU: Campamiento Colonia del Perené, "*cornigera*", 8 ♂ 1 ♀, also 1 male "associated with *cornigera*"; BRAZIL: Porto Cachoeira del Santa Leopoldina, "same as Santa Marta sp.", 1 ♂ and also with label "Aeschna *cornigera*" apparently in F. Foerster's hand; MEXICO: Baja California, Palmarita water hole "*Aeshna manni* paratype", 1 ♂; ARGENTINA: Mendoza, "*Aeshna haarupi*", 1 ♂.

---

[1] Occas. Papers Mus. Zool. Univ. Mich. 216: 26-34. 1930.

On making a minute comparison of 41 characters of one male each of (A) the " cornigera " from Peru, (B) " near *cornigera* but not that species " from Colombia, (C) the paratype of *manni* and (D) the Mendoza *haarupi*, it resulted that the males of " cornigera " and of *manni* agreed, inter alia, in lacking distinctly developed spines on the anterior lamina, while the males of " near *cornigera* but not that species " and of *haarupi* possess a pair of well-developed spines on this structure.

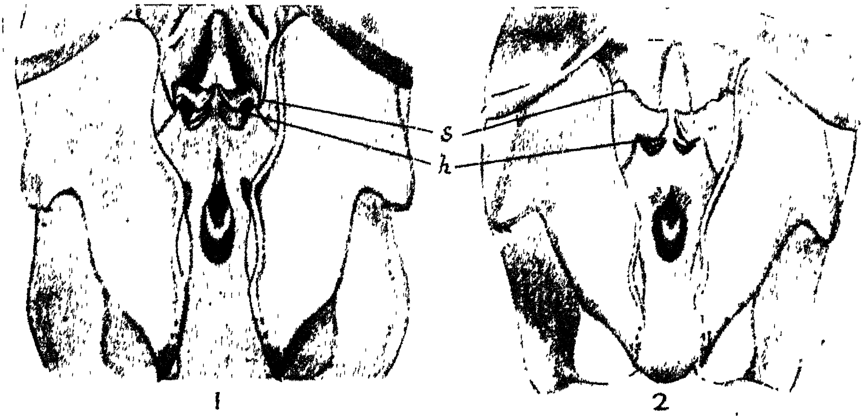
It does not appear that the Williamsons ever had made an examination of, or a comparison with Brauer's type.[2]

Previous descriptions of these species say nothing of the anterior lamina. Brauer's detailed description (1867) of *cornigera* gives the source of his material as " Vaterland: Columbien (*Aeschna chlorophana* Moritz in litt.) ". Hagen's " Notizen beim Studium von Brauer's Novara-Neuropteren ", 1867, p. 49 (p. 19 of the separatum) say of *Ae. cornigera:* " Mir liegen 8 Stucke vor, und zwar bin ich in der Bestimming um so sicherer, als ein Parchen der *Ae. chlorophana* Moritz darunter ist. Diese Art ist von mir ohne Beschreibung in Synopsis of North American Neuroptera p. 314 als *Ae. jucunda* Hag. erwähnt. Ich besitze sie aus Colombien von Moritz, aus Venezuela von Porto Cabello von Appun, aus Neu-Freiburg bei Rio von Beschke und ein kleines Parchen aus Sud-Brasilien, das Männchen von Montevideo von Sello, das Weibchen aus San Leopoldo. Die Art ist also weit verbreitet ".

From the male from Colombia by Moritz in Hagen's collection, now in the Museum of Comparative Zoölogy at Harvard University, Miss Elsie Lincoln made the drawing of the genitalia of the second abdominal segment here photographically reproduced as figure 1. As will be seen, it shows long spines on the anterior lamina very clearly. Another photograph of this same drawing was sent to Dr. Douglas St. Quentin, at Vienna as soon as the cessation of hostilities permitted the resumption of mail correspondence. Accompanying it was a tabular statement of seven most distinctive differences (from the 41 characters mentioned above) for the four forms studied. Dr. St. Quentin was asked to compare the photograph and notes with Brauer's type of *cornigera* in the Naturhistorisches Musem in Vienna and to tell me with which of the four species the type best agrees.

---

[2] Mrs. Gloyd kindly sent me extracts from the Ris-Williamson correspondence on South American Aeshnas. One of these is a letter from Dr. Ris to E. B. Williamson dated 11. I 1925 in which is this paragraph: " For the nomenclature of [the above] forms . . . it would be of importance to see the Brauerian type. The description though good, is not sufficient with all the things now in our hands They are very liberal at Vienna with loan of their types; very probably they would send it to me on request, perhaps even to you over the sea Shall I ask them to send it to me? Or will you try to get it yourself? "



Ventral surface of second abdominal segment × 12

Fig. 1—*Aeshna cornigera* Brauer. Colombia, by Moritz, topotype ♂. Museum of Comparative Zoology.

Fig 2—*Aeshna psilus* new species. Cachí, Costa Rica, March 10, 1910, by P. P Calvert, holotype ♂. *s* spine of anterior lamina, in Fig 2 rudimentary. *h* meso-posterior angle of hamular process.

Photographs by Messrs. Herman A. Walters and A. Delwin Warden, respectively, of drawings by Miss Elsie Lincoln

Dr. St. Quentin graciously responded, under date of Vienna, May 12, 1946: "I have found [as] follows. In the collection of the Museum of Natural History here there are 12 ♂ 3 ♀ of *A. Cornigera.* Brauer's type is in good condition and is from Colombia. All exemplars are uniform.

"The sides of stem of the black T-spot of frons are slightly converging cephalad.

"The pale mesepisternal (antehumeral) stripe is green and reaching almost to the antealar sinus.

"The pale mesepimeral stripe is green, the pale metepimeral stripe also.

"The anterior lamina of the sec[ond] segment shows a long spine exactly as in your drawing.

"The inner (mesal) margin of the app[endages] sup[eriores] is slightly concave, the apex hardly bent ventrad, without a visible hook.

"I think that there is no doubt about your identification with *A. cornigera* (B) '*near cornigera*'. The exemplars of the Williamson's collection with the short spine on the anterior lamina are certainly not conspecific. They may belong to a new species."

For the short spined form, which the Williamsons considered to be *cornigera,* the following specific name is now proposed.

Aeshna psilus[3] new species Fig. 2.

1905, 1907 *Aeshna cornigera* Calvert (not Brauer), Biol. Cent. Amer, Neur., pp. 179, 182, 400 (pars; Texolo 1 ♂, Atoyac 1 ♂, Cuernavaca 1 ♂, Aguascalientes City 1 ♂, Guadalajara 1 ♀, re-examined, are *psilus,* possibly other material there listed from Mexico, Guatemala and Costa Rica may be *psilus*).

1918, *Aeschna cornigera* Ris (not Brauer), Arch. Naturges., 82 Abt A (9)· 157 (pars; probably some examples from Mexico and Costa Rica are *psilus*).

1930 *Aeshna cornigera* E. B. & J. H Williamson (not Brauer), Occas Papers Mus. Zool. Univ Mich., 216: 32, 33 (see preceding discussion).

1932 *Aeshna cornigera* Klots (not Brauer), N York Acad. Sci., Sci Survey Porto Rico, etc, 14(1)·18 (Cuba, Porto Rico; thanks to Mrs Klots I have examined the two [males] cited).

1938 *Aeschna cornigera* Garcia-Diaz (not Brauer) Journ. Agric. Univ. Puerto Rico, 22 (1): 55 (Puerto Rico; the same male as that cited by Mrs. Klots which I have examined).

1943 ?*Aeschna cornigera* Whitehouse (not Brauer) Bull. Inst Jamaica Sci. Series, 3.7, 2 figs (Jamaica).

Diagnosis.—Sides of the black or dark brown stem of the T-spot of the frons parallel or converging cephalad, width of stem at mid-length .74-.94 mm. Stem bordered each side with a pale green or yellow area, narrower than the stem, followed by a larger greenish-blue to grayish-blue spot which is distinct from the pale green or yellow of the lateral surface of the frons adjoining the eyes; this spot may or may not be continued on to the anterior surface of the frons.[4]

Pale mesepisternal (antehumeral) stripe green, reaching upward almost to the antealar sinus, its maximum width (at upper end) 1.00-1.56 mm., width at mid-height .74-1.18 mm.

Pale mes- and metepimeral stripes greenish blue or slightly bluish, widest at their dorsal ends (mesepimeral 2.0-2.83 mm., metepimeral 1.45-2.83 mm.), usually with a concavity on the anterior margin above mid-height (width of mesepimeral at mid-height .4-1.13, of metepimeral at mid-height .57-.94 mm.). (Details of the Aguascalientes male are given by Calvert, 1907, p. 400.)

♂. Anterior lamina with a very short spine each side, .09-.14 mm. long, whose apex does not reach the level of the hamular process.

---

[3] Greek ψιλοσ ("in Attic prose as a military term, οἱ ψιλοι soldiers without heavy armour, light troops". The Classic Greek Dictionary, Hinds Noble & Eldredge Publishers, New York City, 1901, page 797), tranliterated according to Appendix F, International Rules of Zoological Nomenclature

[4] When this bluish spot is not continued on to the anterior surface of the frons, the upper half, or less, of the said anterior surface is usually a reddish brown, but the reddish brown is sometimes present (Santiago de Cuba) even when the bluish spot is continued as described.

Superior appendages, in supero-internal view, with the inner (mesal) margin, at about the middle third, parallel to (in some, slightly converging with) the outer margin; in profile view, the apex usually bent strongly ventrad at about 90°, acute, hooked.

♀. Abdominal appendages 7.28-8.26 mm. long, longer than the combined lengths of abdominal segments 8 + 9 + 10.

Dimensions.—Abdomen (excluding appendages) ♂ 36.5-42.0, ♀ 41-43 mm. Hind wing ♂ 36-42, ♀ 40-43 mm. Pterostigma, front wing ♂ 2.21-2.93, ♀ 2.78-3.03 mm. Superior appendages ♂ 4.90-5.90 mm.

Holotype. Male, Costa Rica, Cachí; stagnant pool, banks of Rio Reventazoń, March 10, 1910, P. P. Calvert (Academy of Natural Sciences of Philadelphia, type No. 9273).

Additional material examined all of which I consider paratypic. MEXICO. Aguascalientes, Aguascalientes City, August 27, 1906, P. P. Calvert, 1 ♂ (A.N.S.P.[5]); Nayarit: Tepic, November 5, 1923, J. H. Williamson, 1 ♂ (U. M.); Jalisco: Guadalajara, September 11, 1903, J. McClendon, 1 ♀ (A.N.S.P.); region of Lake Chapala, December 5, 1923, J. H. Williamson, 5 ♂, San Diego Rancho near Cocula, J. H. Williamson, 4 ♂ 1 ♀ (U.M.); Yucatan: Chichen-Itza, February 5, 1930, F. M. Gaige, 1 ♂ (U.M.); Vera Cruz: Texolo, March 13, 1899, S. N. & M. C. Rhoads, 1 ♂ (A.N.S.P.), Atoyac, Schumann, 1 ♂ (A.N.S.P.); Morelos: Cuernavaca, June, O. W. Barrett, 1 ♂ (A.N.S.P.).

GUATEMALA. Dept. Guatemala, El Fiscal, June 3, 1909, E. B. Williamson, 3 ♂ (U.M.).

COSTA RICA. San José, 1600 m., June 1, 1929, M. Valerio, 1 ♀ (A.N.S.P.), im Hause, December 7, 1935, F. Nevermann 1 ♀ (coll. Erich Schmidt), road San José to La Verbena, May 16, 1909, P. P. Calvert, 1 ♂ (A.N.S.P.). Turrialba, near Rio Turrialba, 610 m., July 24, 1909, 1 ♀; Juan Viñas (formerly Infernillo), laguna, 1000 m., March 19, 1910, 2 ♂, Reventazoń valley, 760 m., July 28, 1909, 2 ♂ P. P. Calvert (A.N.S.P.).

PANAMA. El Volcán Chiriquí, February 19, 1936, F. E. Lutz, 1 ♀ (A.M.N.H.).

ECUADOR.[6] Tungurahua: La Palmera, 1300 m., December 9, 1938, 1 ♂; Napo-Pastaza: Rio Jatun Yacu, 700 m., February 24, 1937, 1 ♂, both by William Clarke Macintyre (coll. C. H. Kennedy).

---

[5] The abbreviations denote the following collections: A.M.N.H., American Museum of Natural History, New York; A.N.S.P., Academy of Natural Sciences of Philadelphia; U.M., University of Michigan, Museum of Zoology, Ann Arbor

[6] For Ecuadorian localities I have followed F. Martin Brown's useful "Gazeteer of Entomological Stations in Ecuador", Ann. Ent. Soc Amer., 34: 809-851, with 10 maps. 1941.

Peru. Junin: Colonia del Perené, Campamiento, 200-300 m., June 6-22, 7 ♂; San Juan trail 3500 ft. [1150 m.] estimated by collector, June 16, 1920, 1 ♂, all 8 by Jesse H. Williamson (U.M.); La Merced, P.C. Biol. Serv, Rivas collector 2 ♂ (coll. C. H. Kennedy).

West Indies. Cuba: Santiago, 1 ♂; Puerto Rico: Adjuntas, June 8-13, 1915, 1 ♂ (A.M.N.H.).

Identification of the females of Ae. psilus

Almost the only character by which I can separate the females of *psilus* from that sex of *cornigera* is the length of the appendages, as stated above, compared with the shorter appendages of *cornigera*. On tabulating the female appendages of both species, I obtain (*a*) one group of six females whose appendages range in length from 7.28 to 8.26 mm, (*b*) one female with appendages of 6.80 mm., (*c*) one female with appendages of 6.54 mm., (*d*), nine females whose appendages range from 6.05 mm., to 5.64 mm., (average diffeernce .051 mm.), (*e*) twenty-five females whose appendages measure 5.15 to 3.44 mm., (average difference .071 mm.).

Group (*a*) is composed of females from Guadalajara and Cocula (Mex), San José and Turrialba (Costa Rica) and El Volcán Chiriquí (Panama). Males of *psilus,* but not of *cornigera*, have been taken at or near these Mexican and Costa Rican localities, but all the males (seven) from El Volcán, Chiriquí, are *cornigera.*

Female (*b*) is from Colonia del Perené, Peru, where eight males of *psilus* and one male of *cornigera* were all obtained by the same collector, Mr. Jesse H. Williamson, who recognized the association of males of the two species in the field on the same day, June 16, 1920. The association of these two species at Colonia del Perené, supported by the existence, in Prof. Kennedy's collection, of one male of *psilus* (9. XII. 38) and of three males of *cornigera* (12. XII 38) all from La Palmera, Ecuador, 1300 meters, affords some explanation of the occurrence at El Volcañ Chiriquí of a female *psilus* and seven males of *cornigera.* It leaves uncertain, however, whether the female (*b*) from Colonia del Perené is *psilus* (to which it seems nearer mathematically) or *cornigera;* it might conceivably be a hybrid.

Female (*c*) and five females of group (*d*) are from the Santa Marta Mountains of Colombia; I have seen no males of *psilus* from Colombia but have before me five males of *cornigera* from the Santa Marta Mountains. All the males and females from these Mountains have the mes- and metepimeral green stripes not constricted in the middle, but I find no other difference separating these males from other males which I refer to *cornigera.*

The remaining four females of group (*d*) are: one from Antigua, Guatemala (where a male *cornigera* was taken the same day, Nov. 24), two from above Tierra Blanca, Costa Rica, whence no males of either species) and one from Pallatanga, Ecuador (whence I have one male of *cornigera*, both sexes from Prof. F. Campos R.). The Antigua male and female have the same green thoracic stripes not constricted near mid-height, the male and female from Pallatanga have them so constricted, the Tierra Blanca females have lost their coloring. Lastly group (*e*), with a greater range of length than any other group, is represented by 25 females from localities in Venezuela, Ecuador, Peru and Brazil, from many of which males of *cornigera*, but not of *psilus*, have been obtained. Among them are females from Merida, Venezuela, and Rio Negro, Boyaca, Colombia, with short appendages (4.58, 4.34 and 4.25 mm.) and with the green mes- and met-epimeral stripes not constricted near mid-length. I, therefore, refer all the females of groups (*d*) and (*e*) to *cornigera*.

Aeshna cornigera Brauer Fig. 1.

1865 *Aeschna cornigera* Brauer, Verh. Zool.-bot. Ges Wien, 15:906 (Columbien)

1866 *Aeschna cornigera* Brauer, Reise der Novara, Neur, p. 70, t. 1, fig. 16, (apps ♂).

1867 *Aeschna cornigera* Hagen, Verh. zool.-bot Ges. Wien, 17. 49 (see quotation anteá).

1899 *Aeschna cornigera* Calvert, Proc. Calif. Acad. Sci, (3) Zool, 1 (12) 408 (Brauer's type at Vienna)

1904 *Aeschna cornigera* Ris, Hamburg Magal. Sammelreise Odon., p. 23, (Brasilien).

1905, 1907 *Aeshna cornigera* Calvert, Biol. Centr. Amer, Neur, pp. 179, 182, 400 (pars).

1913. *Aeschna cornigera* Ris, Mem. Soc. Ent. Belg, 22: 81 (Argentina).

1918 *Aeschna cornigera* Ris, Arch. Naturges., 82 A (9):157 (pars).

1919 *Aeshna cornigera* Calvert, Ent. News, 30:37 (Guatemala: material, re-examined, is all *cornigera*).

1933 *Aeschna* (species?) Needham, Amer Mus Novit., 664: 1 (Thanks to Prof. Needham, I have examined the single ♀ from Mt. Roraima to which this citation refers; it may be *cornigera*).

1909 *Not Aeschna cornigera* Martin, Cat Coll Zool. Selys, fasc. 18: 46; (*Cf.* 1930 Williamsons, Occas. Papers Mus Zool. Univ. Mich., 216:34).

Aeshna "near *cornigera* but not that species" Williamson: (specimens so labeled by him in coll. Mus. Zool Univ. Mich. See preceding discussion).

Diagnosis.—Sides of the black or dark brown stem of the T-spot of frons converging cephalad, or parallel, width of stem at mid-length .65-1.10 mm. Stem bordered each side with a pale yellow or green area, narrower than the stem (and usually narrower than in *psilus* and may be reduced to a width of .08 mm.), followed by a larger greenish blue (in some grayish blue) spot which may or may not be continued on to the anterior surface of the frons and is distinct from the yellow or pale green which is often on the lateral surface of the frons adjoining the eye margin. More or less of the upper part of the anterior surface of the frons reddish brown.

Pale mesepisternal (antehumeral) stripe green reaching upward almost to the antealar sinus, its maximum width (at upper end) 1.23-2.04 mm., width at mid-height .74-1.96 mm.

Pale mes- and metepimeral stripes green, widest at their dorsal ends (mesepimeral 1.96-3.27 mm., metepimeral 1 14-3.27 mm.), with or without a concavity [7] on the anterior margin above mid-height, width of mesepimeral .33-1.96 mm. at mid-height, of metepimeral .41-1.80 mm. (Details of a Rio de Janeiro and a Colombian male are given by Calvert, 1907, p. 400.)

♂. Anterior lamina with a long slender spine each side, .5- 8 mm. long, whose apex extends caudad beyond the level of the most concave part of the hind margin of the hamular process (see fig. 1) or to, or beyond, the level of apex of meso-posterior angle of hamular process.

Superior appendages, in supero-internal view, with the inner (mesal) margin, at about the middle third, slightly concave, not parallel or almost parallel to the outer margin; in profile view, the apex bent slightly ventrad, acute, not hooked.

♀. Abdominal appendages 3.44-6.80 mm. long, shorter than the combined length of abdominal segments 8 + 9 + 10.

Dimensions.—Abdomen (excluding appendages) ♂ 38-45 mm., ♀ 38-44. Hind wing ♂ 37-43, ♀ 39-44. Pterostigma, front wing ♂ 2.13-2.70, ♀ 2.54-2.78. Superior appendages ♂ 4.74-5.52.

Holotype. Colombia, by Moritz, 1 ♂ Naturhistorisches Museum, Vienna (see page 3). Topotype, Colombia by Moritz, 1 ♂ Museum of Comparative Zoölogy, Cambridge, Massachusetts (see page 2).

In the preparation of this paper I have studied 130 males, 48 females of *cornigera* from localities in Mexico, Guatemala, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia, Paraguay, Brazil (Mt. Roraima and south of 15° South Latitude), Uruguay and Argentina (A.M.N.H., A.N.S.P., Cornell Univ., Museum of Comparative Zoology, U.S. National Museum and the private collections of Mr. John Cowley, Dr. D. C. Geijskes, Prof. C. H. Kennedy, Prof. J. G. Needham and Dr. Erich Schmidt, to all of whom I return thanks).

A full list of these localities and of the number of specimens from each, as well as detailed descriptions and figures of the four species diagnosed in this paper, will be included in the extended paper on neotropical species of *Aeshna* now in preparation.

Aeshna manni E. B. & J. H. Williamson

1930. *Aeshna manni* E. B. & J. H. Williamson, Occas. Papers Mus. Zool. Univ Mich., 216: 26, pl. III (♂ ♀ Los Parres and Palmarita, Baja California, Mexico)

1895. *Aeschna cornigera* Calvert (not Brauer), Proc. Calif. Acad. Sci., (2) IV: 507, pl. XV, figs. 24, 31, 32 (Baja, California).

---

[7] Compare anteà pages 6-7

Diagnosis.—Sides of the black or dark brown stem of the T-spot of the frons parallel, width of stem at mid-length .75-.82 mm., or converging cephalad from .98 mm. at posterior end to .57 mm. at anterior end, width at mid-length .65, (Harbison's male). Stem bordered each side with a yellow area, narrower than the stem, .65 mm. wide, followed by a larger greenish-blue spot which is continued on to the anterior surface of the frons but is sharply distinct from the narrow pale yellow which borders the eye margin.

Pale mesepisternal (antehumeral) stripe " yellow or yellowish green or blue " (Williamsons), pointed anteriorly, not reaching to the anterior mesepisternal margin, reaching upward only half-way to the antealar sinus, from which it is separated by 2.30-2.62 mm., width .82 mm., length 1.47-1.80 mm.

Pale mes- and metepimeral[8] stripes pale blue, both widest at their upper ends in the male, (mesepimeral 2.53 mm., metepimeral 2.62-2.86 mm.); in the only known female the Williamsons describe the former as yellow " with its upper fourth obliterated except for a small spot near the lateroalar ridge ", the latter as yellowish green and show it (fig. 24) as widest at its upper end and constricted near its middle. Both stripes in the male narrowest at or near mid-height (mesepimeral .5-.65 mm., metepimeral .65-.73 mm.).

♂. Anterior lamina without spines (see Williamsons' pl. III, fig. 26; this figure has the posterior end uppermost while our figures for *psilus* and *cornigera* have the posterior end lowermost).

Superior appendages, in supero-internal view, with the inner (mesal) margin, at about the middle third, slightly convex, not parallel to the outer margin, the apex bent strongly ventrad at about 90°, acute, hooked.

♀. Abdominal appendages 10 mm. long (" estimated length ", Williamsons, p. 31).

Dimensions.—Abdomen (excluding appendages) ♂ 43-41.5 mm., ♀ 44. Hind wing ♂ 44-45, ♀ 45. Pterostigma front wing ♂ 3.27-2.78, ♀ 3.33. Superior appendages ♂ 5.15-5.64 (♀ dimensions from the Williamsons).

Material examined.—MEXICO: Baja California, without further locality, 1 ♂ " from Harbison of San Diego " (in Prof. Needham's collection): Palmarita, October 8, 1923, J. H. Williamson, 1 ♂ (Williamsons' paratype, U.M.): San Raymundo, April, 1889, C. D. Haines, 1 ♂, very much faded (A.N.S.P.).

Aeshna haarupi Ris

1908. *Aeschna haarupi* Ris, Deut. ent. Ztschr., 523, fig. 4 (apps. ♂, T-spot, thoracic pattern) (Argentina: Pedregal, Chacras de Coria).

1909. *Aeschna haarupi* Martin, Cat Coll. Zool. Selys-Longch., fasc. 20·212, fig. 219 (apps ♂).

1909. *Aeshna haarupi* Ris., Calvert. (Probably *not* this species.) Ann. Carn. Mus., 6. 222 (Rio de Janeiro)

---

[8] In the Williamsons' description they are incorrectly stated, p. 27, to be on the " mes- and metepisternum " but their figures 23 and 24, plate III, show them to be mes- and metepimeral.

Diagnosis.—Sides of the black or dark brown stem of the T-spot of the frons converging strongly cephalad, width of stem at posterior end .90-.82 mm., at anterior end .33 mm., at mid-length .55-.33 mm.[9] Stem bordered each side with a pale area wider than the stem, followed by a gray blue spot sharply distinct from yellow on the lateral surface of the frons bordering the eye margin.

Pale mesepisternal (antehumeral) stripe bluish, reaching upward almost to the antealar sinus, its maximum width (at upper end) 1.23-1.47 mm., width at mid-height .65-.82 mm.

Pale mesepimeral stripe pale bluish, (greenish in Chacras de Coria ♀), not widened at upper end, .65 mm. (a separate pale bluish spot above it at the dorsal margin of the sclerite) and .41 mm. wide at mid-height (Mendoza ♂ ♀); or widened at upper end to 2.37 mm. width by union of stripe and spot, .82 mm. wide at mid-height (Ch. de C. ♀); in all, on the anterior margin of the stripe, a deeper concavity at mid-height and a shallower, wider concavity below.

Pale metepimeral stripe pale blue (greenish, Ch. d. C. ♀), widest at the dorsal end. ♂ 1.64-2.04, ♀ ♀ 2.45 mm., due to union of stripe with a spot at the dorsal margin of the sclerite, narrowed at or near mid-height, ♂ .33-.50, ♀ ♀ .57 mm., corresponding to a deep concavity on the anterior margin of the stripe.

♂. Anterior lamina with a slender spine each side, about .41 mm. long, whose apex extends caudad as far as the level of the apex of the meso-posterior angle of the hamular process.

Superior appendages, in supero-internal view, with the inner (mesal) margin, at about the middle third, almost straight, almost parallel to the outer margin; in profile view, the apex bent ventrad, acute, hardly hooked.

♀. Abdominal appendages 2.86-3.11 mm. long, shorter than the combined length of abdominal segments 9 + 10.

Dimensions.—Abdomen (excluding appendages) ♂ 36 mm., ♀ 38. Hind wing ♂ 38, ♀ 38-39. Pterostigma, front wing, ♂ 2.62, ♀ 2.86-3.11. Superior appendages ♂ 4.74.

Material examined.—ARGENTINA: Mendoza, May 11, 1908, 1 ♂, October 27, 1906, 1 ♀ "from Morton" with label "Aeschna haarupi Ris ♀" in Morton's handwriting; Ch[acras] de Coria, December 2, 1907, 1 ♀, topotypic (U.M.).

Mendoza and Chacras de Coria are at altitudes respectively of 724 and 936 meters (for the latter see P. Jorgensen, Proc. Acad. Nat. Sci. Phila., 1913, p. 274).

All four species here treated have a ventral spinulose tubercle on abdominal segment 1; the right and left pale antehumeral stripes diverging

---

[9] In the topotypic female from Chacras de Coria, the sides of the stem are concave, stem equally wide, .82 mm., at posterior and anterior ends, .33 wide at mid-length. The Mendoza female is as given above in the text

cephalad from each other, a small pale spot above each stripe immediately in front of the antealar sinus and a small pale spot in the sinus; supratriangular cross veins and 2-celled internal triangle on all wings, hind wings with three vertical rows of cells in the anal loop; males with mid-dorsal carina on the tenth abdominal segment, ventral surface of the tenth abdominal segment, and of the ninth abdominal segment behind the gonapophyses pale blue, superior appendages without an inferior basal tubercle, anal triangle of hind wings 3-celled.

Usually they may be quickly differentiated by the following key.

1. Pale antehumeral stripe reaching upward almost to the antalar sinus 2
Pale antehumeral stripe reaching only half-way up to the antealar sinus, ♂ anterior lamina without spines, ♀ appendages 10 mm. long .... *manni*
2. Pale area on either side of the stem of the T-spot of frons wider than the stem, ♂ anterior lamina with spines .4 mm. long, ♀ appendages 2.86-3.5 mm. long *haarupi*
Pale area on either side of the stem of the T-spot narrower than the stem 3
3 Anterior lamina of ♂ with spines 5-8 mm long, ♀ appendages 3.44-6.80 mm. long .. .. *cornigera*
Anterior lamina of ♂ with rudimentary spines .09-.14 mm long, ♀ appendages 7.28-8.26 mm. long .... *psilus*

I have examined the penes of these four species, but have not been able to differentiate them.

It is difficult to state the differences of the superior appendages of the males because a slight turn or twist of an appendage gives an altered appearance; they are included in the preceding diagnoses, however.

Considering merely these four species, it appears that, of those with a long-spined anterior lamina in the males, *cornigera* extends from Mexico (one doubtful individual) and Guatemala along the Andes to Tucuman, Argentina, and thence to southern Brazil and Uruguay, while *haarupi* is known at present only from Mendoza Province, Argentina.

On the other hand, *psilus*, with an almost spineless anterior lamina in the male, extends from central Peru northward, also along the Andes, to 22° North Latitude in Mexico, thence to Yucatan and the Greater Antilles, and culminates in the spineless laminate *manni* of Baja California, which last, alone of the four, has the reduced pale antehumeral stripe.

As has been pointed out above, page 6, the imagos of *cornigera* and of *psilus* have been found at the same locality and on the same, or almost the same, day and are therefore to be regarded as sympatric species.[10] Whether the larvae of the two species live in the same waters is unknown.

---

[10] See the discussion in Dr. E. Mayr's Systematics and the Origin of Species, New York, 1942, pp. 148 et seq.

NOTULAE NATURAE

NUMBER 195 OF JUNE 13, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A REVISION OF THE PELECYPOD FAMILY TRIDACNIDAE

BY RICHARD A. McLEAN

Assistant Curator, Department of Mollusks,
The Academy of Natural Sciences of Philadelphia

The status of some of the species in the Family Tridacnidae has been very uncertain since the time of Linnaeus' Tenth Edition. As sessile or attached organisms they are subject to the action of their environment to a greater degree than free living species. This has resulted in a great variation in form and general appearance and a consequent confusion in the delimitation of the several species.

The Tridacnidae are found listed in current literature as closely related to the Cardiidae, but Hedley, in 1921 has put forth a very good argument for a closer relationship with the Carditidae. The writer is inclined to agree with Hedley's view placing them near this family.

There are two genera, *Tridacna* and *Hippopus*.

TRIDACNA Bruguière

Tridacna Bruguière, 1797, Encyc. Meth. (Tabl Vers) pl. 235.
Tridachnes Roding, 1798, Mus. Bolt., vol. 2, 171.
Tridacne Link, 1807, Beschr. Nat Samml. Univ. Rostock (3), p 153.

Genotype.—*Tridacna gigas* (Linnaeus), by subsequent designation of Lamarck, Mém. Soc. Hist. Nat. Paris, 1799.

Key to the species of Tridacna

1	Shell strongly folded, ribs pronounced	2
	Shell not strongly folded, ribs low and flat	*crocea*
2	Major ribs five or less, scales widely spaced or absent	3
	Major ribs six or more, scales closely spaced	4
3	Ribs with prominent scales	*squamosa*
	Ribs without scales	*gigas*
4	Rib scales crowded close together on the upper third of shell	*maxima*
	Rib scales widely spaced on upper third of shell	*noae*

Tridacna gigas (Linnaeus) Figs. 1-3.

Chama gigas Linnaeus, 1758, Syst. Nat., Ed. 10, p. 691.

Tridacnes derasa Roding 1798, Mus. Bolt., vol. 2, p. 172.

Chama gigantea Perry, 1811, Conchol., p. 2.

Tridacna mutica Lamarck, 1819, Anim. s. Vert., vol. 6, p. 106.—Chenu, 1845, Illustr. Conch., vol. 2, pl. 4, figs. 1-1a.—Sowerby, 1912, Proc. Mal. Soc. London, vol. 10, (1), p. 30.

Tridacna serrifera Lamarck, 1819, Anim. s. Vert., vol. 6, p. 107.—Reeve, 1862, Conch. Icon., vol. 14, pl. 6, fig. 6.—Sowerby, 1912, Proc. Mal. Soc. London, vol. 10, (1), p. 30.

Tridacna gigas Sowerby, 1887 (not Linnaeus), Thes. Conch., vol. 5, p. 179, pl. 4, fig. 11.

Tridacna squamosa serrifera Sowerby, 1887 (not Lamarck), Thes. Conch., vol. 5, p. 180, pl. 6, fig. 17.

Tridacna obesa Sowerby, 1899, Proc. Mal. Soc. London, vol. 3 (4), p. 210, two text figs.

Tridacna gigantea Hedley, 1916 (not Perry), Proc. Linn. Soc. N. S. Wales, vol. 41, p. 686.

Range.—Indian Ocean, Australia, Solomon Islands, through the central Pacific to the Philippines and the Loo Choo Islands.

In the genus *Tridacna* we find species which are capable of growth to a greater size than that attained by any other bivalve genus. This is an interesting phenomenon but it appears to be accompanied by problems directly related to this large size. These great, senile specimens do not have clearly displayed the usual diagnostic characters of the members of this genus. Instead the lunular opening is practically closed, the surface sculpture, other than the major ribs, is largely obliterated and even the shape may be somewhat distorted.

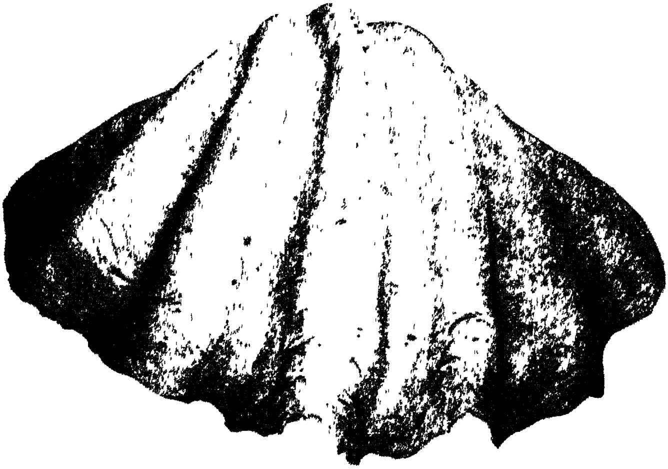
The name *gigas* of Linnaeus is clearly founded on one of the huge shells, as he gives the weight of his specimen as 532 pounds[1]. In the early days of binomial nomenclature all members of the genus were called *gigas*. Gradually the various species were split off and named by subsequent workers. More names were proposed than there are species to represent them. However, the original species, *gigas*, has remained in an ambiguous condition even to the present time. Many forms had been called *gigas* by one author or another until in 1912 G. B. Sowerby[2] stated: "I have not been able with any certainty to trace the young of this species; the shells supposed to represent it in Reeves Conch. Icon. figs. 1b, c I regard as very unlikely; at all events they are inseparable from the diversiform *T. elongata*." Some years later, in 1921, Charles Hedley[3] wrote: "Even yet there is some uncertainty about its synonymy and development. It is possible that two or more species, distinct in youth, may converge in age until they are alike Giant Clams."

---

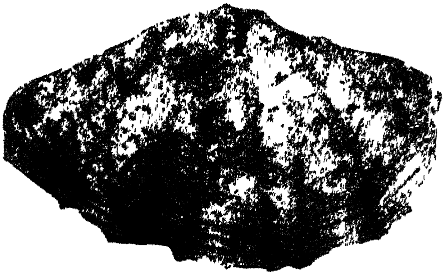
[1] 532 Swedish pounds equaled 498 English pounds at that time, according to Dillwyn, Catal. Shells, 1817.

[2] Proc. Mal. Soc. London, vol. 10 (1), p. 29.

[3] Rec. Australian Mus., vol. 13 (4), p. 169.

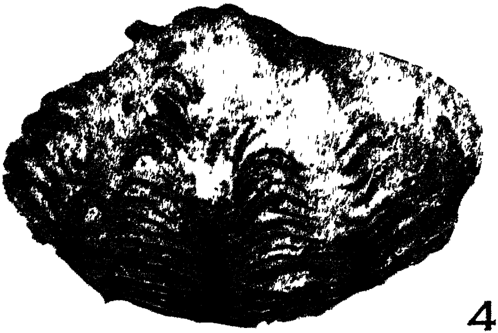


1

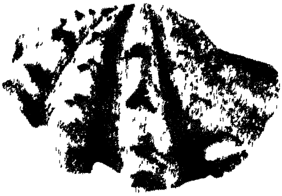


2

3



4



5

FIG. 1.—*Tridacna gigas* (Linnaeus). Left valve: length 58 cm. FIG. 2.—*Tridacna gigas* (Linnaeus) Left valve: length 36.5 cm. FIG. 3.—*Tridacna gigas* (Linnaeus). Right valve: length 17 cm. FIG. 4.—*Tridacna squamosa* Lamarck. Left valve: length 39.5 cm. FIG. 5.—*Tridacna squamosa* Lamarck Right valve: length 15 cm.

The present author has carefully studied the representatives of this genus in the collections of the Museum of Comparative Zoology at Harvard College and the Academy of Natural Sciences of Philadelphia as well as the extensive collections made in the Solomon Islands by W. J. Eyerdam while a member of the Whitney South Sea Expedition. Living specimens were also collected and examined on reefs in the southwest Pacific. After this first-hand work, as well as a careful study of most of the early literature dealing with this group, it is believed that the synonymy of *gigas* is as listed above. It is a species without scales on the ribs except for the small ones near the pedal opening which have given rise to the name *serrifera*. A graded series before me now ranging from a juvenile specimen about an inch long up through individuals five inches, eight inches and fourteen inches to one almost two feet long presents clearly the steps in the development of a single distinct species. However, it is perfectly possible that Hedley was correct and that *T. squamosa* may in senility lose the scales and become a " giant clam " resembling the adult *gigas*.

Tridacna squamosa Lamarck Figs. 4, 5.

Tridacna squamosa Lamarck, 1819, Anim. s Vert., vol. 6, p. 106.—Chenu, 1845, Illustr. Conch., vol. 2, p 1, pl. 3, figs. 1-5.—Reeve, 1862, Conch. Icon., vol. 14, pl. 3, fig. 3a. pl. 4, figs. 3b, c. d; Sowerby—1887, Thes. Conch., vol. 5, p. 180, pl. 1, fig. 2, pl. 2, fig 7, pl. 5, fig. 15

Range.—Indian Ocean, Australia, Solomon Islands, through the central Pacific to the Philippines, the Loo Choo Islands and Japan.

This species with its four to five major ribs, generally smooth surface and widely spaced scales is clearly marked and there has been little confusion in its identification.

Tridacna noae (Roding) Figs. 8, 12.

Tridacnes noae Röding. 1798, Mus. Bolt. vol 2, p 171

Tridacna elongata Lamarck, 1819, Anim s Vert., vol. 6. p. 106—Chenu, 1845, Illustr. Conch., vol 2, p. 1, pl 1 fig. 2, 2a, pl. 2 fig. 1, 1a. 1b, 2, 3.—Reeve, 1862, Conch. Icon., vol. 14, pl 2, figs. 2a, b.—Sowerby, 1887, Thes. Conch., vol. 5, p. 181, pl. 2, figs. 3, 4

Tridacna gigas Reeve, 1862, (not Linnaeus). Conch. Icon., vol. 14, pl. 2, fig 1b—Sowerby, 1912, Proc Mal. Soc. London, vol. 10 (1), p. 29.

Tridacna rudis Reeve, 1862. Conch. Icon., vol 14, pl. 5, figs. 4a. b, c.—Sowerby, 1887, Thes. Conch. vol. 5. p. 182, pl. 4, figs 13, 14.

Tridacna compressa Reeve, 1862, Conch Icon. vol 14, pl. 6, fig. 5a. pl 7, figs 5b, c.

Tridacna lanceolata Sowerby, 1887. Thes Conch., vol 5, p. 181, pl. 6, fig 18

Tridacna reevei Hidalgo, 1903. Mem R Acad Cienc. Madrid, vol 21, p 389.

Tridacna troughtoni Iredale. 1927, Rec Australian Mus, vol. 16 (1); p. 75 pl. 5, figs 9, 10.

Range.—Zanzibar, Mauritius, Indian Ocean, Australia, Solomon Islands, Carolines, Marshalls and Loo Choo Islands.

This appears to be one of those cases where a well-known name must be relegated to the synonymy and a previous name used in its place. Roding gives as an illustration of his *noae,* figure 494 in Chemnitz, Conch. Cab. volume seven. This is a figure of a shortened, rather broad specimen of the same species called *elongata* by Lamarck. The elongate form is more typical of the species but a considerable variation in shape is exhibited.

This species is very similar in general appearance to *maxima.* Both are extremely variable in outline, number and form of the ribs, abundance and shape of the scales etc. However, as pointed out in the key, the species *noae* has the scales upon the ribs well spaced, particularly on the upper third of the shell, while in *maxima* they are closely crowded, giving the appearance of sculpture as found in *crocea.*

Sowerby [4] has proposed the name *Tridacna acuticostata* for a form with sharply angular ribs and small, low pointed scales. There are examples of this in the collection of the Academy of Natural Sciences of Philadelphia, but it seems hardly distinct enough for specific rank. At most it might be called *Tridacna noae acuticostata,* but the present author prefers to regard it as one of the many variants of this highly variable species.

Tridacna maxima (Roding) Figs. 6, 7, 9.

Tridacnes maxima Roding, 1798, Mus Bolt, vol. 2, p. 171.

Tridacna gigas Chenu 1845, (not Linnaeus), Illustr. Conch., vol 2, p. 1, pl. 1, figs. 1, 1a.

Tridacna gigas Reeve, 1862, (not Linnaeus), Conch. Icon., vol. 14, pl 1, fig. 1a (probably also pl. 2, fig 1c).

Tridacna crocea Sowerby, 1887, (not Lamarck), Thes. Conch., vol. 5, p. 181, pl. 2, fig. 5.

Tridacna mutica Sowerby, 1887, (not Lamarck), Thes. Conch., vol. 5, p. 180, pl. 1, fig. 1, pl 4, fig. 12.

Tridacna scapha Meusch Sowerby, 1887, Thes Conch., vol. 5, p. 181, pl. 6, fig. 16.

Tridacna lamarcki Hidalgo, 1903, Mem. R. Acad. Cienc. Madrid, vol. 21, p. 385

Range.—Indian Ocean, Australia, Solomon Islands, Tuamotu Islands, Marshall Islands, Palmyra Island, Philippines and Loo Choo Islands.

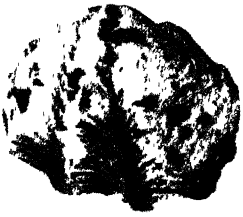
This species, like *noae,* is capable of a great deal of variation in size, shape, ribbing and sculpture. The variations can be separated by the characters mentioned under that species. This is perhaps one of the most abundant species of the genus in the southwest Pacific.

Hedley [5] proposed a form under the varietal name of *fossor.* Considering the great variability of *maxima* there may be some doubt as to the validity of *fossor.* However, it may very well be a distinct form in the Australian fauna. Hedley apparently had a large series before him when he wrote

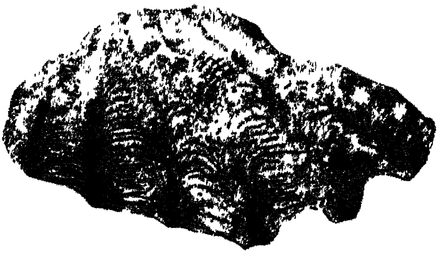
---

[4] Proc Mal. Soc. London vol. 10 (1), p. 30, text figure, 1912.

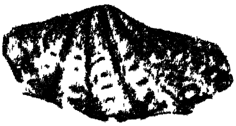
[5] Rec. Australian Mus, vol. 13 (4), p. 171, pl. 29, fig. 6, pl. 33, fig. 11.



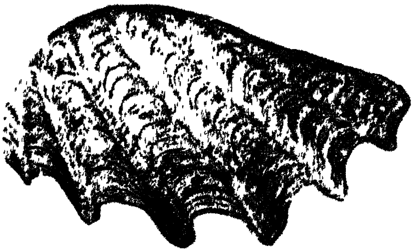
6



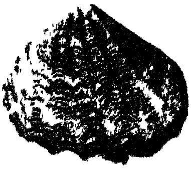
7



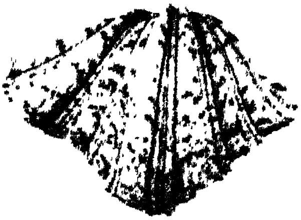
8



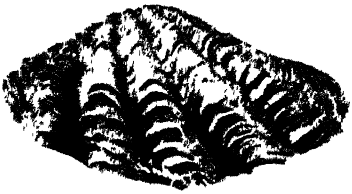
9



10



11



12

FIG. 6.—*Tridacna maxima* (Roding). Right valve: length 12.5 cm. FIG. 7.—*Tridacna maxima* (Röding). Right valve: length 35.5 cm. FIG. 8.—*Tridacna noae* (Roding). Right valve: length 12.5 cm. FIG. 9.—*Tridacna maxima* (Roding). Right valve: length 24.5 cm. FIG. 10.—*Tridacna crocea* Lamarck. Right valve: length 10 cm. FIG. 11.—*Hippopus hippopus* (Linnaeus). Right valve: length 15.5 cm. FIG. 12.—*Tridacna noae* (Röding). Right valve: length 21 cm.

the description. It is characterized by having the umbones well forward, being very broad and tumid and by an unusually large pedal opening.

Tridacna crocea Lamarck Fig. 10.

Tridacna crocea Lamarck 1819, Anim. s. Vert., vol. 6, p. 106.—Chenu, 1845, Illustr. Conch., vol. 2, p. 2, pl 4, figs. 2, 2a.—Reeve, 1862, Conch Icon., vol. 14, pl. 8, figs. 9a, b.—Sowerby, 1887, Thes. Conch., vol 5, p 181, pl 2, fig 6, pl. 3, figs 8, 9, 10.

Tridacna cumingii Reeve, 1862, Conch Icon., vol. 14, pl 7, figs 7a, b.

Tridacna ferruginea Reeve, 1862, Conch. Icon., vol 14, pl. 8, figs. 8a, b.

Range.—Indian Ocean, Australia, Solomon Islands, Admiralty Islands, Philippine Islands, Loo Choo Islands and Japan.

This species is one of the most distinct in the genus. Commonly it has no scales on the ribs, although some specimens show scaling near the margin. Some shells of *maxima* resemble *crocea* in general appearance through having lived under restricting circumstances. The ribs of these specimens, however, are more prominent than those on shells of *crocea* and the distal ends of the ribs appear quite different on the inside of the shell. Those of *crocea* are smoothly rounded and quite pointed, while in these other specimens which roughly resemble *crocea* they end in a flattened tip edged on each side by a low, indistinct carina. Usually such specimens show evidences of constriction by their environment in the presence of smooth abrasions where the shell has rubbed against the restraining coral. Deformities of this kind are not uncommon in boring or burrowing species.

HIPPOPUS Lamarck

Hippopus Lamarck, 1799, Mem. Soc. Hist. Nat. Paris, p. 86.

Hippopas Scudder, 1882, Suppl. List, p 163.

Genotype.—*Chama hippopus* Linnaeus, 1758, by monotypy.

There is only one species in this genus.

Hippopus hippopus (Linnaeus) Fig. 11.

Chama hippopus Linnaeus, 1758, Syst. Nat., Ed 10, p. 691.

Hippopus maculatus Lamarck, 1801, Syst. Anim., p. 117.

Range.—Indian Ocean, Australia, Solomon Islands, Admiralty Islands, Philippine Islands, Loo Choo Islands and Japan.

This is a very distinct species and there has been little if any confusion in its identification in the literature. It exhibits a certain amount of variatoin in shape, sculpture and coloration but cannot be confused with any other species.

NOTULAE NATURAE

NUMBER 196 OF JUNE 13, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

TWO NEW TYRANT FLYCATCHERS FROM PERU

BY JAMES BOND

Associate Curator of Birds, The Academy of Natural Sciences of Philadelphia

Some time ago, while rearranging the forms of Tyrannidae in the collection of this Academy, I found it necessary to describe a new race of *Myiophobus pulcher* from Peru (Bond, Not. Naturae, no. 127, 1943, p. 1). Further study of our Peruvian specimens of this family indicates that at least two more subspecies from this country require description.

I am again indebted to Dr. John T. Zimmer of the American Museum of Natural History for his courtesy in permitting me to examine material in that institution. Furthermore, Dr. Zimmer kindly compared for me his central Peruvian specimens of *Tolmomyias flaviventris* with examples of *dissors,* a race not represented in the Academy's collection.

Tolmomyias flaviventris zimmeri new subspecies

TYPE.—♂ ad., A.N.S.P. no. 91924, collected December 25, 1929, at Perené (2000 ft.), Chanchamayo, Department of Junín, Peru, by M. A. Carriker, Jr.

Description.—Resembles *T. f. subsimilis* Carriker, of southeastern Peru and Bolivia, but entire underparts decidedly greener, less golden yellow. This is, perhaps, most evident on the throat. Resembles *T. f. viridiceps* (Sclater and Salvin), of northeastern Peru, southeastern Colombia and western Brazil, but lighter, more yellowish green, above, and yellower below. Also near *T. f. dissors* Zimmer, of northern Brazil and the Mt. Duida region of Venezuela, which race " has the upperparts and the wing markings slightly more yellowish green, and the underparts with a little stronger tinge of ochraceous. In particular, there is a definite ochraceous orange tinge on the lores which is absent in the Peruvian birds " (Zimmer; *in litt.*).

Measurements of type.—Wing 62.25, tail 49, bill (exposed culmen) 11, tarsus 17.5 mm.

Range.—Tropical Zone of Peru (1000-4000 ft.), from the Department of San Martin south to the Department of Junín.

Specimens examined.—*T. f. viridiceps*, PERU: Puerto Indiana, 2 ♂, 1 ♀ *.

T. f. zimmeri, PERU: Río Seco (30 miles west of Moyobamba), 1 ♂ *; Moyobamba, 1 ♂, 1 ♀; El Tingo, 2 ♂; La Merced, 1 ?*; Tulumayo, 2 ♂ *; Perené, 5 ♂, 1 ♀; San Juan de Perené, 1 ♂; Puerto Yessup, 1 ♂.

T. f. subsimilis, PERU: Huacamayo, 1 ♀; La Pampa 2 ♀.* BOLIVIA: " Guanay," 1 ♂ *; Huanay, 2 ♂, 1 ♀; Santa Ana, 1 ♂, 1 ♀.

Pseudotriccus pelzelni peruvianus new subspecies

TYPE.—♂ ad. (t. e.), A.N.S.P. no. 109746, collected August 20, 1932, near the Río Jelashte (4500 ft.), on the eastern slope of the Eastern Cordillera, in the Department of San Martin, Peru, by M. A. Carriker, Jr.

Description.—Resembles *P. p. pelzelni* Taczanowski and Berlepsch, of the eastern slope of the Andes of Colombia and Ecuador, but underparts duller without a strong yellow wash, the center of the abdomen very pale yellow with a slight greenish tinge, not clear yellow.

Measurements of type.—Wing 58.5, tail 45, bill (exposed culmen) 10, tarsus 19 mm.

Range.—Known only from the type locality.

Specimens examined.—*P. p. connectens*, COLOMBIA: Río Munchique, 1 ♂, 1 ♀.

P. p. pelzelni, ECUADOR: below Sumaco, 5 ♂ *, 6 ♀ *; Baeza, 1 ♂.

P. p. peruvianus, PERU: Río Jelashte, 3 ♂, 1 ?, 1 ♀ (juv.).

---

* Specimens in American Museum of Natural History, New York.

NOTULAE NATURAE

NUMBER 197 OF JULY 25, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

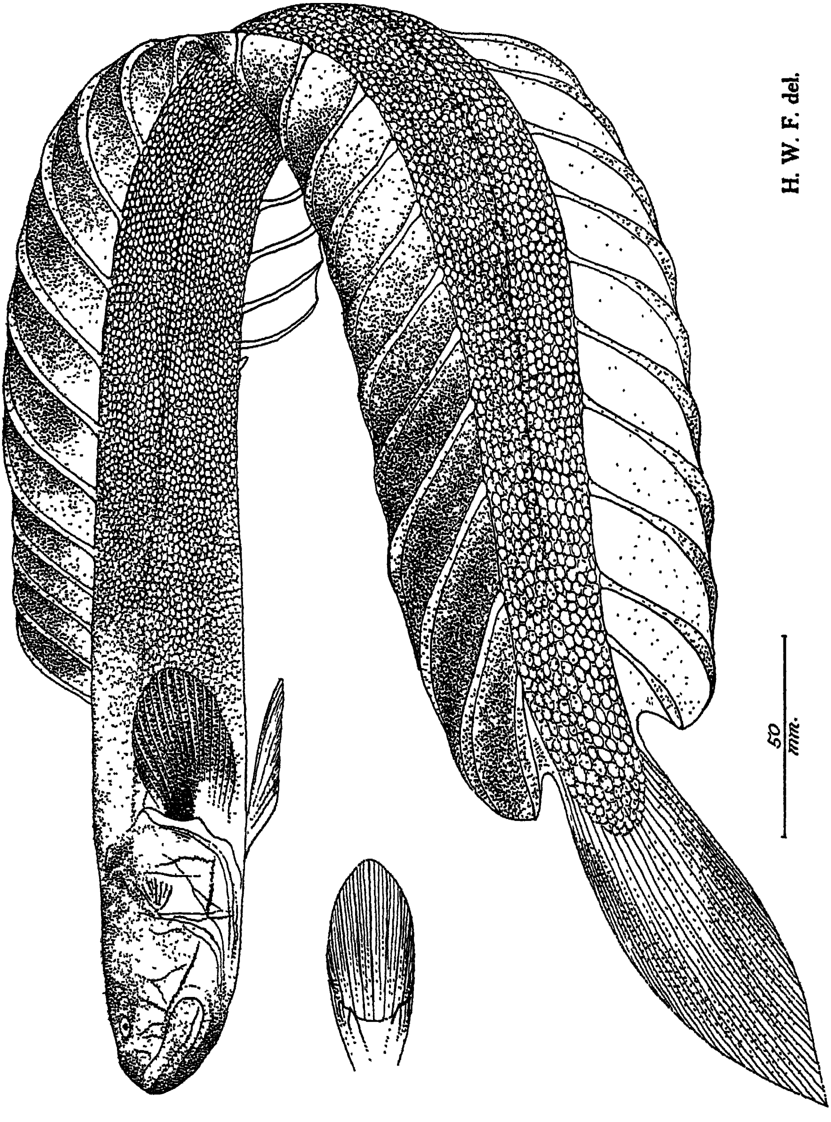
THE BARRETO—GOBIOIDES BROUSSONNETII LACÉPÈDE—OBTAINED IN FLORIDA BY CAPTAIN WILLIAM B. GRAY

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

This interesting fish is a member of the family Gobioididae and is the sole representative of its genus. It was sent to the Academy for identification by Captain Gray under date of April 18th 1947, from Marineland. He writes: "I was collecting specimens at Salerno, Florida (about 200 miles south of Marineland), about one month ago. I noticed this fish slowly swimming by my boat, which was anchored in the Inland waterway. I had no time to reach for a net, so I reached over the side and caught it with my hand and threw it into the boat before it could wiggle out of my grasp. It lived in a live-well in my collecting boat about 5 days, but died during one of the very cold nights we were having at the time. I do not know if the cold had anything to do with the death of this fish. I only mention it because I had some bonefish and barracudas in the live-wells at the same time which died because of the sudden cold spell". We are grateful to Captain Gray for this gift to the Academy.

Although the species has long been known, but few detailed accounts have appeared in the literature, also but few figures and these quite diverse. I have therefore prepared the accompanying drawing from the Salerno specimen. The species is widely distributed in the western tropical Atlantic, with only a single previous notice of its occurrence in the Gulf of Mexico, the specimen having been sent to New Orleans. I find no record for Florida. The references given below indicate the comparatively few definite localities known. The crude scaleless cut presented by Lacépède is doubtless intended



H. W. F. del.

Fig. 1.—*Gobioides broussonnetii* Lacépède.

for the present species. The figure which appeared in Cuvier's Règne Animal, as published by Valenciennes in 1839, was evidently modified and colored from that of Lacépède.

Gobioides broussonnetii Lacépède Barreto. Figure 1.

Gobioides broussonnetii Lacépède, Hist. Nat. Poiss., vol. 2, 1800, p. 580, pl. 17, fig 1 (type locality, "partie de la collection que la Hollande a donnée à la nation françoise" [suggested as possibly from Surinam]).—Valenciennes, Règne Animal, Poiss., atlas, 1839, pl. 80, fig. 3.—Jordan and Evermann, Bull. U.S.Nat. Mus., no. 47, pt. 3, 1898, p. 2263 (copied Steindachner).—Evermann and Marsh, Bull. U.S.Fish Comm., vol. 20, pt. 1, 1900 (1902), p 300 (compiled).—Meek and Hildebrand, Field Mus. Publ., no. 249. Zool. ser, vol. 15, pt 3, Sept. 1, 1928, p. 894 (compiled) —Jordan, Evermann and Clark, Rep. U.S Comm. Fisher., pt. 2, 1930, p. 448 (compiled).—Nichols, N.Y Acad. Sci. (Surv Puerto Rico), vol. 10, pt. 3, 1930, p. 369, outline figure (compiled) —Rivero, Bull. Mus. Comp. Zool., vol. 82, no. 3, 1938, p. 216 (holotype of *Gobioides barreto* Poey).

Gobioides broussoneti [error] Valenciennes, Règne Animal, Poiss., atlas, 1839, legend opposite pl. 80.—Jordan and Eigenmann, Proc. U.S.Nat. Mus, vol. 9, 1886, p. 512 (compiled).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., ser. 2, vol. 1, pt. 1, 1888, p. 75 (São Matheos; Rio de Janeiro; Rio Pará: type of *Gobioides barreto* Poey) —Bean and Bean, Proc. U S Nat Mus., vol. 17, 1894(1895), p. 631, fig. 1 (Gulf of Mexico).—Ribeiro, Archiv. Mus. Hist. Nat. Rio de Janeiro, vol 21, 1918, p. 151 (compiled).

Gobioides broussonneti Ribeiro, Revista Mus. Paulista, vol. 10, 1918, p. 782 (Iguape).

Goboides [error] *broussonnetii* Fowler, Arquiv. Zool. São Paulo, vol. 3, art. 6. 1941, p. 177 (Brazilian localities).

Amblyopus (*Gobioides*) *broussonetii* [error] Steindachner, Denks. Akad. Wiss. Wien, vol. 42, pt. 1, 1880, p. 95, pl. 3, fig. 2—a (Cuba; Amazon; Pará; Rio de Janeiro).

? *Gobius brasiliensis* Schneider, Syst. Ichth. Bloch, 1801, p. 69 (type locality, Brazil) (D. XVIII, 21; A. 19).

Gobius oblongus Schneider, Syst. Ichth. Bloch, 1801, p. 548 (based on Lacépède) (precludes same name proposed by Steindachner 1860 for a fossil).

Gobioides barreto Poey, Mem. Hist. Nat. Cuba, vol. 2, 1860(1861), p. 282 (type locality, Cuba); Anal. Soc. Españ. Hist. Nat., Madrid, vol. 10, 1881, p. 338 (Puerto Rico).

Amblyopus mexicanus O'Shaughnessy, Ann. Mag. Nat. Hist., ser. 4, vol. 15, 1875, p. 147 (type locality, Mexico).

Depth 13⅘; head 2½ to vent, 6⅗ to caudal base, width 2⅛ in its length. Snout 5⅛ in head as measured from snout tip; eye 12¾, without free lids, diameter 2¾ in snout; maxillary 2⅔ in snout as measured from snout tip, extends well behind eye; teeth in jaws in rather narrow villiform bands, outer row enlarged; interorbital 2 in snout, broadly convex; opercle with about 10 radiating keels. Gill opening lateral, length of cleft 2⅕ in head as measured from snout tip.

Scales imbedded, separated, little larger on tail posteriorly than on trunk. Head, median predorsal region, prepectoral region and chest naked. Papillae appear as dark to blackish lines on side of head, made up of minute spots or dots.

D. IV, 19, spines flexible and largely distinguishable from rays by their smaller size; A. 17, anterior shorter, all flexible; caudal peduncle moderately deep, compressed, least depth 3 in head; long caudal ends in median point behind, its length 2¾ in rest of tail as measured to vent; pectoral rays 16, fin 2 in total head length; ventrals united, each with flat spine and 5 rays, length 1½ in total head length; anal papilla small, depressed point.

Color when fresh in alcohol dark grayish above, paler to drab or whitish on under surfaces. Muzzle dark drab, also sides of head above. Eye paler gray than adjacent part of head. Dorsals dark, variably grayish. Anal whitish, rays at posterior part of tail all with more or less grayish. Tail and caudal grayish. Pectoral with dark grayish blotch above and ends of rays grayish. Ventrals whitish.

Length 545 mm.

The specimen figured by Bean and Bean was 342 mm. long, its eye said to be half the length of the snout, the figure showing it placed midway between the upper profile of the head and the maxillary which only reaches as far back as hind edge of the eye, though the description says " maxilla extends well behind the eye ". It is also said to have the eye about equal to the interorbital space. Although Bean and Bean state their "specimen [was] obtained in the Gulf of Mexico by Mr. Robert S. Day, of New Orleans, Louisiana ", according to Jordan and Evermann it was " once taken near New Orleans."

NOTULAE NATURAE

NUMBER 198 OF SEPTEMBER 12, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

A NEW GENUS AND TWO NEW SPECIES OF NEOTROPICAL PSEUODOPHYLLINAE (ORTHOPTERA: TETTIGONIIDAE)

BY JAMES A. G. REHN

Curator of Insects, Academy of Natural Sciences of Philadelphia

Recently Dr. Neal Weber, of Swarthmore College, the well-known student of ants and ant-life, placed in my hands a small but interesting series of Neotropical Orthoptera, which he had collected, and which included a most striking, and as results showed previously unknown, genus of the pterophylloid section of the Pseudophyllinae. In placing this genus and species it was necessary to check over our series of certain genera to which the new one appeared to be related, and in so doing there was brought to light the second and a very distinct new species of the genus *Lophaspis*, which I had collected in Costa Rica in 1923. The descriptions of these forms are here presented.

The Academy wishes to thank Dr. Weber for the gift of the type of the new *Caribophyllum*.

CARIBOPHYLLUM[1] new genus

A member of the *Diophanes* section of the Group Pterophyllae, yet showing in certain respects some affinity to the restricted *Pterophylla* section of the group. Its nearest relationship appears to be with *Diophanes* Stål,[2] and *Xestoptera*[3] and *Lophaspis* Brunner,[4] with material of the genotypic species of all of which genera comparison has been made, as well as with those of all of the other members of the restricted *Pterophylla* section except *Caloxiphus* Saussure and Pictet,[5] which latter genus, however, is widely different.[6]

---

[1] I. e Carib. *one of the principal aboriginal stocks of the West Indies*, and φυλλον, *a leaf*, in allusion to its general form, and its relationship to certain genera the names of which are derived in part from the latter noun.

From *Diophanes* (genotype *D. salvifolia* (Lichtenstein)) the new genus differs strikingly in the appreciably compressed conchate character of the auditory foramina of the cephalic tibiae. in the much less decided and uniformly impressed character of the two transverse sulci of the pronotum (instead of the caudal being the more marked), in the tegmina having the marginal field much less densely areolate and the oblique rami more numerous, regular and evident, with the humeral trunk sinuate and much elevated in proximal half, its elements not diverging distad, the anterior ulnar vein reaching almost to the tegminal apex and angularly sinuate, and the axillary field of both tegmina with a definite stridulating structure in the female sex (quite different from that in *Diophanes*), in the peculiar and pterophyllid development of the costal area of the wings in the female, in the wing disk having the transverse nervures heavily infuscate on a whitish base, and in the female subgenital plate being deeply V-emarginate distad.

From *Xestoptera* Brunner (genotype *X. cornea* Brunner) the present genus differs in the compressed conchate character of the auditory foramina of the cephalic tibiae, in an entire lack of the surface glabrosity so marked in *Xestoptera*, in the general characteristics of the sculpture of the pronotum, in the more nearly quadrate lateral lobes of the pronotum, in numerous venational details of the tegmina, as the pronounced and numerous oblique rami in the marginal field (subobsolete in *Xestoptera*), and the more irregular disposition of the longitudinal major veins of the discoidal field (male sex only of *Xestoptera* examined), in the elevated character of the elements of the humeral trunk, in the tessellate wing pattern, in the distal emargination of the female subgenital plate (truncate in *Xestoptera*) and in the moderately arcuate ovipositor (subrect in *Xestoptera*).

---

[2] Bihang K. Svenska Vet.-Akad Handl., III, no. 14, p. 38, (1875). Genotype (by monotypy)—*D. rosaceus Stål.*

[3] Monogr. der Pseudophyll., pp. 21, 244, fig 106, (1895) Genotype (by selection of Kirby, 1906).—*X. cornea* Brunner.

[4] Idem, pp. 21, 244, fig 107, (1895) Genotype (by monotypy).—*L scabriuscula* Redtenbacher.

[5] Biol. Cent-Amer., Orth., I. p. 445, pl. XXI, figs. 16, 17, (1898).—Genotype (by monotypy)—*C. championi* Saussure and Pictet

[6] Serville's genus *Thliboscelus* (Hist Nat. Ins, Orth, p. 441, (1839)) is an absolute synonym of *Pterophylla*, having been founded solely on *Locusta camellifolia* Fabricius, which is the species properly selected by Kirby in 1906 (Synon. Cat. Orth., II. p. 343) as the genotype of *Pterophylla*. The species *Cyrtophyllus crepitans* Redtenbacher (Proc Zool. Soc. London, 1892, p. 213, pl. 17, fig 14), described from St. Vincent, Lesser Antilles, has been referred to *Thliboscelus* by Kirby (vide supra, p 345), but it belongs to the genus *Chlorocoelus* Bates or represents a closely related undescribed genus. I have seen no material of *crepitans*, but now have the Amazonian genotypic species of *Chlorocoelus* (*C. tanana* Bates) before me, and the two species apparently are not widely separated.

From *Lophaspis* Brunner (genotype *L. scabriuscula* Brunner) *Caribophyllum* differs in its less compressed form, its distinctive pronotal sculpture (this lacking the medio-longitudinal dorsal cristate tectation characteristic of *Lophaspis*), in its narrower and less spatulate tegmina (with greatest depth at proximal instead of distal third), these having a far greater number and complexity of the accessory cross-veins, a much less regular quadrate areolar pattern, and a more longitudinal disposition of the major veins of the discoidal field as well as the more numerous and regular cross-veins of the marginal field of the tegmina, in the unusual specialization of the anal field of the female tegmina, in the simpler and non-sublamellate spines on the ventral margins of the femora, and in the less regularly falciform outline of the ovipositor, this being straighter proximad in *Caribophyllum*.

Generic features.—General form moderately robust pseudophylloid, in female sex (only known) suggesting *Pterophylla* but limbs more elongate and more robust, surface not polished, of pronotum subshagreenous, of tegmina coriaceously phylloid.

Head with fastigium not surpassing antennal scrobes, acute produced, sulcate dorsad; eyes subhemispherical; face transversely rounded. Pronotum sellate, dorso-cephalic margin arcuate, dorso-caudal margin obtuse-angulate; no distinct median carina present except for a trace on the metazona, mesad a low rounded node is situated immediately cephalad of the principal transverse sulcus; prozona slightly longer than metazona; two transverse sulci present, these shallowly impressed, lateral lobes roughly subquadrate, moderately longer than deep. Tegmina moderately lanceolate, nonspatulate in outline, extending as far caudad as apices of caudal femora, moderately narrowing in distal half, apex well rounded, marginal field broad, with oblique rami numerous, regular, closely placed and parallel, areolae numerous but irregular in density and continuity; humeral trunk sinuate in direction, definitely elevated proximad, its elements not markedly diverging distad; anterior ulnar vein reaching sutural margin briefly before apex of tegmen, multiangularly sinuate; axillary field of female with definite stridulating potentialities, each tegmen having a longitudinal intra-marginal arcuate thickened second axillary vein, which has its dorsal surface thickly supplied with a regular series of minute file-like asperities. Wings cycloid when expanded, with marginal field broadly expanded and with regularly spaced oblique cross-veins, disk, when wing is expanded, of the usual pterophylloid dorsally convex type, with area about each cross-vein conspicuously blotched, thus producing a subconcentrically barred pattern. Ovipositor robust, definitely arcuate only in distal three-fifths, ventral margin distad finely serrulate. Subgenital plate with distal margin deeply V-emarginate. Prosternum markedly bispinose; mesosternum and metasternum with lateral lobes acute-angulate at apices, suberect, directed ventro-laterad, foraminal aperture of metasternum moderately transverse. Spines of ventro-cephalic margins of femora simple, not sublamellate, ventro-caudal margins unspined, genicular lobes of all femora spined; cephalic tibiae with auditory foramina compressed conchato-rimate, dorsal margins of cephalic tibiae unspined, of median tibiae with a few spines proximad on the dorso-caudal margin.

Distribution.—Known only from the western (Haitian) end of the island of Hispaniola, Greater Antilles.

Relationship.—It is possible this genus may prove to be a connecting link between the largely Nearctic *Pterophylla* section of the group *Pterophyllae*, and the Neotropical one centering about *Diophanes*. It is natural to regard the Pseudophyllinae as of tropical origin, as the warmer regions of the world are where we find its greatest differentiation. On the other hand the genus *Pterophylla* has pushed northward into areas where frost comes relatively early in the Autumn. It is quite possible that *Caribophyllum* may be representative of a basic complex from which development has proceeded in divergent directions to produce the two relatively distinct sections of the Pterophyllae.

Genotype.—*C. necopinum* new species.

Caribophyllum necopinum[7] new species Figs. 1 and 2.

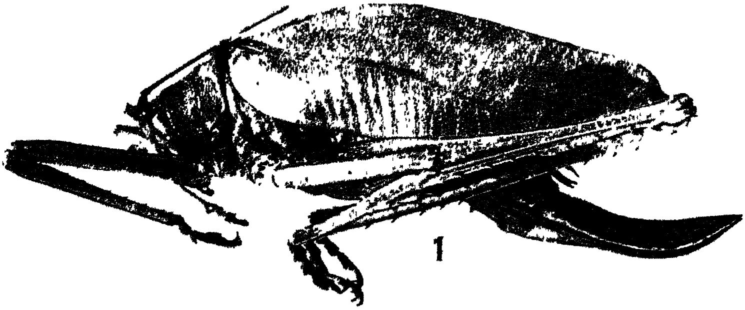
Type.—♀; Pétionville, Haiti. August 19, 1936. (Neal Weber, no 639.) [Academy of Natural Sciences of Philadelphia, Type no 5748.]

Size rather large (length of body to apex of supra-anal plate 40.5 mm).

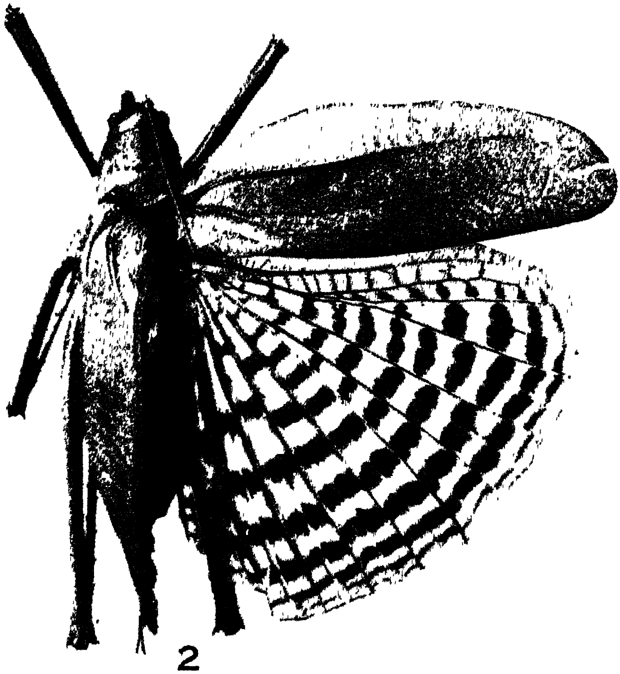
Head with its exposed dorsal length (to apex of fastigium of vertex) contained 3.5 times in medio-dorsal length of pronotum, greatest breadth of head across genae slightly greater than two-thirds of the head depth (as 6.3 to 9 mm.); occiput well rounded transversely; fastigium of vertex failing to reach as far cephalad as internal margin of antennal scrobes, sharply acute-produced and sulcate medio-longitudinally on dorsal surface, in profile some-

---

[7] I.e necopinum, *unexpected or unlooked for.*



1



2

Caribophyllum necopinum new genus and species. Female (type). Pétionville. Haiti. Fig. 1.—Lateral view (× 1½). Fig. 2.—Dorsal view (× 1½).

what upcurved distad; fastigium of face acutely produced dorsad between antennal scrobes, the internal margins of which separate it from the fastigium of the vertex; antennae incomplete.

Pronotum with greatest breadth caudad across lateral lobes equal to greatest medio-dorsal length; first of the two transverse sulci straight, the second (or principal one) arcuate caudad in middle, encircling the caudal base of the median node, which in profile is more sharply outlined caudad than cephalad; subshagreenous surface sculpture of the pronotum appreciably pitted on the lateral lobes as well as on the dorsum of the metazona; lateral lobes with greatest ventral breadth subequal to the entire depth of the pronotum, cephalic margin subvertical, ventral margin moderately arcuate, caudal margin moderately oblique converging ventrad, both ventral angles narrowly rounded, a distinct subconical surface node present at the ventro-cephalic one.

Tegmina in outline rounded lanceolate, greatest breadth, which is at middle, contained 2.69 times in the length, narrowing more distinctly distad than proximad; costal margin in its immediately proximal portion sharply rounding to tegminal base, thence distad but weakly arcuate to near tegminal apex, where it rounds more strongly over the apex to join the weakly arcuate, in fact slightly sigmoid, sutural margin; marginal field quite broad, at basal third equal to three-sevenths of the breadth of the entire tegmen, narrowing distad, the oblique rami in the marginal field as a whole distinct, regular, evenly disposed and subparallel except in proximal fourth, where they cross the rudimentary mediastine vein and are more irregular and anastomosing, number of oblique rami 25 to 30, some few bifurcate; humeral trunk quite definitely sinuate, of its two elements the discoidal is more elevated and prominent on the dorsal surface, while the humeral is much more ridge-like and conspicuous on the ventral one; median vein not prominent, diverging from discoidal vein in middle of tegmen, its direction and trend modified by the low angles produced by the junctures of numerous crossnervures; anterior ulnar vein markedly multiangularly sinuate, for the same reason as, and to a much greater degree than, the median vein; crossnervures of discoidal field numerous and forming areas of various shapes, generally subquadrate or rectangulate, but occasionally trigonal or pentagonal, each containing a considerable number of areolae of a definitely minor category and even more varied and irregular outline; axillary field with anal vein little developed on left tegmen, virtually obsolete on the right one, first axillary vein moderately developed, parallel to and very near the oblique free margin of the base of the field, distad passing into the second axillary vein which is strongly developed, arcuate inwards, subparallel to the sutural margin of the field, and in both fields with its dorsal surface supplied with an extensive and regular series of microscopic stridulating nodules,[8] elongate acute-elliptical juxta-sutural portion of the field between the second axillary vein and the sutural margin of the field with a number of oblique subparallel cross-veins, which apparently act as stiffeners, while the sutural margin itself is distinctly and cingulately thickened, and this section of the field is appreciably decurved. Wings definitely cycloid, with length and breadth subequal, the peripheral margin of the radiate field evenly arcuate, costal margin low arcuate, the curvature flatter distad than proximad, apex rounded; expansion of marginal field marked, its greatest breadth, at proximal fourth, forming one-seventh of the total breadth of the wing, oblique rami of marginal field seventeen in number, regularly spaced and parallel, except immediately proximad where they are anastomosed with the abbreviate mediastine vein, discoidal field with two parallel series of quadrate to rectangulate cells, these separated by the anterior ulnar vein, those of the ulnar area having the cross-nervures more oblique than in the discoidal-ulnar area.

---

[8] What these nodules engage to produce a stridulation is not clear, although very probably the moderately decurved and thickened sutural margin of the axillary field may be the answer. This would appear to me to be the most likely explanation.

Prosternum with the paired processes erect, elongate acute, weakly diverging distad. Mesosternum with lateral productions more elongate than those of the metasternum, as a whole more acutely developed, median cruciform impression well developed, the excavate caudal half rather deeply impressed, the foveolae widely separated; metasternum with lateral productions less elongate, their free margins rectangulate with the apices somewhat acute-produced, impressed median surface vase-shaped in outline, with its cephalic width and median length subequal, its surface passing caudad to the foveolar fossa, into which the paired foveolae open.

Supra-anal plate broad linguiform, its proximal breadth very slightly less than its median length (as 17 to 20), lateral margins evenly converging to the narrowly rectangulate apex, surface ascending to base in proximal third, deplanate elsewhere; cerci reaching as far distad as the apex of the supra-anal plate, styliform, tapering, apices acute, general form gently upcurved; ovipositor with its length slightly more than half that of tegmen, median depth contained four times in the length, proximal half as seen in profile with its axis sublongitudinal, of distal half appreciably upcurved, dorsal margin moderately concave, straightening distad, ventral margin weakly sigmoid in proximal two-fifths, thence distad arcuate with immediate preapical section straight, apex acute, serrulation of ventral margin present in distal fourth; subgenital plate with median emargination occupying nearly half the length of the plate, lateral margins appreciably inbowed, the lateral apices moderately acute.

Cephalic and median limbs proportionately long and but moderately slender; cephalic femora nearly twice as long as pronotum, ventro-cephalic margin with 4-5 spaced and relatively small spines distad; cephalic tibiae very faintly longer than the femora, quadrate in cross-section, as a whole very slightly compressed, but that of auditory conchations so marked that they do not extend appreciably laterad of the general lateral tibial surfaces when viewed from dorsum, the dorsal rimation of the same areas being slightly more open proximad than distad; median femora very similar to cephalic ones, ventro-cephalic margin with 3-4 spines. Caudal femora relatively stout, but tapering distad from deepest point, which is situated at the proximal third and equal to one-sixth of the femoral length, ventro-external (ventro-cephalic) margin with 10-12 spaced dentiform spines, the ventro-internal (ventro-caudal) unarmed; caudal tibiae quadrate in cross-section, all margins spined.

Coloration.—General tone of body, tegmina and limbs courge green (of Ridgway), deepening areally to biscay green and paling on the limbs to pale yellowish citrine, and on the antennae to old gold. Eyes dresden brown marbled with fuscous. Tegminal marginal field with its base color weaker than that of the remainder of the tegmina, costal margin narrowly edged with chalcedony yellow, a brief line of the same shade present at the base of the discoidal field along the inner side of the humeral trunk, the immediately proximal section of the latter washed with zinc orange and over this lightly clouded linearly with dresden brown. Wings with anterior field pale tiber green (of Ridgway); radiate field opaque grayish white with the transverse nervures and the adjacent membrane, both proximad and distad, broadly barred transversely with bister, sometimes becoming as dark as fuscous, the radiate veins themselves increasingly involved in the infuscation toward the inner portion of the wing; immediate periphery of radiate field narrowly and weakly washed with old rose. Ovipositor washed with fuscous distad, particularly along the margins.

Measurements.—Length of body (to apex of supra-anal plate), 40.5 mm.; length of pronotum, 8.4; greatest width of pronotum (across lateral lobes caudad), 8.4; length of tegmen, 38.5; greatest width of tegmen, 14.3; length of wing, 36; greatest width of wing, 35.5; length of cephalic femur, 16.5; length of median femur, 15.5; length of caudal femur, 32; length of caudal tibia, 34.8; length of ovipositor, 20.

Remarks.—This striking species is known only from the unique type. Dr. Weber, its collector, advises me it was found at midday in shade along a stream-bed just above Pétionville, resting on a large leaf two feet above the ground.

Lophaspis hebardi[9] new species Figs. 3 and 4.

Closely related to *L. scabruscula* Saussure and Pictet, from the Volcán de Chiriquí, Panama,[10] but differing in the less strongly tectate dorsum of the pronotum, in the more rounded and less angulate caudal margin of the same, in the tegmina being more evenly elliptical in outline, proportionately longer in relation to their greatest width, which latter is situated nearer the middle and not at distal third as in *scabriuscula*, in the tegminal apex being narrower and less broadly rounded, and in all the limbs being proportionately somewhat longer and more robust, the cephalic and median femora and caudal tibiae also being quite definitely stouter.

---

[9] In memory of my long-time associate and friend, the late Morgan Hebard, to whose inspiration and cooperation for over four decades my own studies owe so much.

[10] Biol. Cent.-Amer., Orth., I, p. 448, pl. XXI, fig. 24, (1898). [♂ (type as figured), ♀; Volcán de Chiriquí, 2000-3000 feet, Panama; Chiriquí, Panama.] I have used for comparison, from the Academy collection, a female of *scabruscula*, taken on the Rio Colorado, Volcán de Chiriquí, at 4300 feet elevation, on June 5-9, 1937, by Dr. W. Bishop. This individual is somewhat smaller than the original measurements of that sex given by the describers, but as it was taken at a higher elevation than the type series this is understandable. In all essential features, however, the available specimen of *scabruscula* agrees with the original description. (See figs. 5 and 6.)

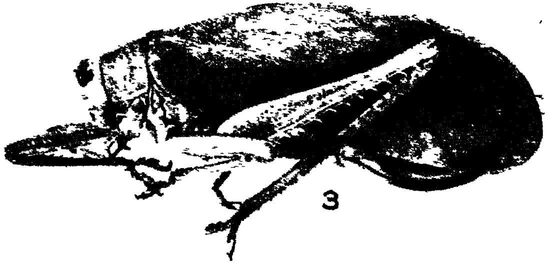
Type.— ♀ ; La Emilia, near Guápiles; Costa Rica. Elevation, 1000 feet. August 24, 1923. (J.A G.Rehn.) [Academy of Natural Sciences of Philadelphia, Type no. 5749.]

Size rather large (length with tegmina closed, 55 mm.); form moderately compressed; surface moderately polished.

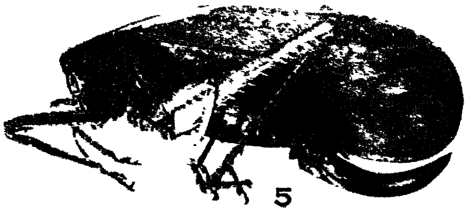
Head with exposed dorsal length equal to two-fifths the medio-dorsal length of the pronotum, greatest breadth across genae equal to two-thirds of total head depth, occipital line in profile low arcuate declivent cephalad, fastigium of the vertex, as seen from dorsum, distinctly compressed distad of paired ocelli, the lateral margins there subparallel, apex rounded acute, medio-dorsal sulcation deep, the whole ventro-cephalad narrowly separated from the fastigium of the face; eyes prominent, with subcircular basal outline somewhat flattened ventrad. Antennae at least 1.5 times as long as the overall length of the insect.

Pronotum with its medio-dorsal length equal to its greatest breadth across the lateral lobes, its dorsal tectation distinct but definitely less marked and lower than in *L. scabriuscula*, on the metazona much lower cephalad and subobsolete caudad, the metazona flatter and somewhat broader proportionately than in *scabriuscula*, its greatest breadth being but little less than four-fifths of the total pronotal length (as 19 to 25, while in *scabriuscula* it is 17.5 to 24); surface of pronotum shagreenously rugose; cephalic margin of pronotal dorsum broadly obtuse-angulate, caudal margin of some evenly arcuate except for an almost imperceptible median angulation; principal tranverse sulcus situated virtually in the middle of the pronotum, the more cephalic one placed faintly cauded of the middle of the prozona, both slightly less strongly impressed than in *L. scabriuscula* but the notch of the median keel where intersected by the principal sulcus is more open than in the previously known species: lateral lobes essentially as in *scabriuscula*, their breadth distad equal to five-sixths of the depth of the whole pronotum.

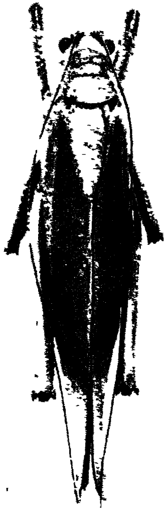
Tegmina in lateral view with outline elliptical, with greatest breadth, which is median, contained slightly more than three times in the length, the sutural outline evenly arcuate from the apex of the anal field to the actual apex of the tegmen, which is slightly nearer the costal side and is much more narrowly rounded than in *L. scabriuscula,* costal margin in large part nearly straight, distad rather sharply rounding to the apex; texture of tegmina micro-areolately coriaceous, venation distinct but little elevated above the general surface; marginal field broad, mesad comprising but little less



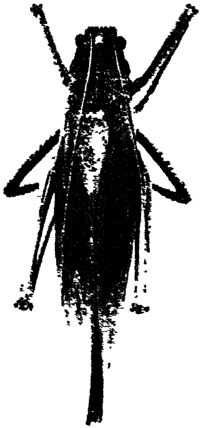
3



5



4



6

Lophaspis hebardi new species Female (type) La Emilia, near Guápiles, Costa Rica. Fig. 3—Lateral view (natural size) Fig. 4—Dorsal view (natural size)

Lophaspis scabriuscula Brunner. Female Rio Colorado, El Volcán, Chiriquí, Panama. Fig. 5.—Lateral view (natural size). Fig 6.—Dorsal view (natural size) than half of tegminal width, mediastine vein distinct but not extending distad of proximal third of tegmen, well marked oblique rami in marginal field 6-7 in number; humeral trunk with its two elements narrowly separating in distal third, median vein hardly distinguishable from the other oblique rami of the discoidal field, diverging slightly distad of middle of tegmen, including the median vein there are four sub-oblique rami in the discoidal field, all multiangulate in their general course due to the junctures with numerous cross-nervures which outline the many oblique quadrate, rectangulate to subhexagonal interspaces, all of these oblique rami reaching the sutural or distal margin in the distal fourth of the tegmen, anterior ulnar vein having the same general character as the other sublongitudinal veins of the discoidal field, similarly integrated into the interspace pattern of the tegmen, the interspaces in the proximal half of the whole tegmen larger, more longitudinal and less compressed laterally than distad

Sternal characters as in *L. scabriuscula* except that the prosternal processes are more attenuate and slightly more aciculate, the trigonal lateral productions of the mesosternum and of the metasternum also somewhat sharper at their apices.

Supra-anal plate elongate trigonal,[11] its proximal breadth equal to slightly less than two-thirds of its median length, lateral margins nearly straight oblique convergent to the narrow apex, which is minutely emarginate, the lateral margins also narrowly deflexed, surface of plate impressed proximo-mesad; cerci somewhat longer than the supra-anal plate, relatively stout, hardly tapering in proximal half but markedly so in distal fourth, apex briefly aciculate, the whole gently upcurved as viewed in profile; ovipositor nearly equal in length to two-thirds that of the caudal femora, its median depth contained 6.25 times in its length, general form and both margins regularly arcuate in outline, but less strongly so than in *L. scabriuscula*, apex acute; subgenital plate relatively short, appreciably transverse, its distal margin narrowly and rather deeply V-emarginate, angles of bounding processes rectangulate with immediate angle faintly mammillate.

Limbs as a whole proportionately more elongate and robust than in *L. scabriuscula*, the femora and caudal tibiae especially deeper and stouter; cephalic and median femora slightly more fusiform than in *scabriuscula* as seen in profile, ventro-cephalic margin of cephalic femora with 3-4 distal spiniform teeth, of median femora with 5; caudal femora with ventro-external (ventro-cephalic) margin with 12-13 sublamellate slightly recurved spiniform teeth.

Coloration.—(Type.) Head, most of ventral surface and ovipositor light dull green-yellow (of Ridgway) to light chalcedony yellow, tegmina, pronotum, and limbs largely apple green, areally paling to clear dull green-yellow and darkening caudad on the pronotal disk and as a lining along numerous tegminal veins to biscay green, or even light elm green, caudal femora with ventral surface and teeth straw yellow, external face ticked with pale lumiere green; antennae chalcedony yellow, darkening to buffy citrine distad; eyes old gold; ovipositor washed with cinnamon-brown distad, suture pencilled with same. The paratype, taken the same day, in the same immediate environment and preserved in the same fashion (eviscerated at the same time), is far more buffy, with its general tone between naples yellow and straw yellow (of Ridgway), with only limited areas of the tegmina as greenish as olive lake, the venation being contrasted by its definitely buffy tone. The color of this specimen shows no indications of being due to desiccation and probably illustrates the tonal range seen so frequently in members of this family.

---

[11] The supra-anal plate of the female of *scabriuscula* is definitely linguiform in outline, its apex rather broadly rounded, while the cerci are much more evenly tapering distad

Measurements.—Length of body (to apex of supra-anal plate), 38.5 mm.; length of pronotum, 8.6; greatest breadth of pronotum across caudo-lateral angles of lateral lobes, 8.6; length of tegmen, 47.5; greatest breadth of tegmen, 15.5; length of cephalic femur, 12.5; length of median femur, 12.3; length of caudal femur, 29.3; length of caudal tibia, 29.5; length of ovipositor, 20.[12]

Variation.—The single paratype shows no noteworthy difference from the type, except that it is very slightly larger, and has the buffy coloration discussed above.

Bionomics.—The type and paratype were taken the same morning in undisturbed rain-forest near La Emilia,[13] a cattle property of the United Fruit Company, a few miles from Guápiles, Costa Rica. The elevation was about 1000 feet, in the upper level of the Santa Clara Plain, which gradually rises from the San Juan River to the north slopes of the volcanoes of the Cordillera Central. The two specimens taken were both resting on the upper surface of broad-leafed components of the heavy undergrowth in the primaeval forest.

Specimens examined: 2 ♀.

COSTA RICA: La Emilia, near Guápiles, elevation 1000 feet; VIII, 24, 1923; (J. A. G. Rehn); 2 ♀ (type and paratype); [A.N.S.P.].

---

[12] The measurements of the above mentioned specimen of *L. scabriuscula* are as follows: length of body, 37.5 mm., length of pronotum, 7.9; greatest breadth of pronotum, 7.9; length of tegmen, 40.5; greatest breadth of tegmen, 17; length of cephalic femur, 11; length of median femur, 10.9, length of caudal femur, 23; length of caudal tibia, 23.5; length of ovipositor, 18.3.

[13] For a general description of the locality and environment see Rehn, Yearbook Acad. Nat. Sci. Phila.; 1923, pp. 24-28

NOTULAE NATURAE

NUMBER 199 OF SEPTEMBER 12, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

NOTES ON BAHAMA FISHES OBTAINED BY MR. CHARLES G. CHAPLIN IN 1947, WITH DESCRIPTIONS OF TWO NEW SPECIES

BY HENRY W. FOWLER

Curator of Fishes, The Academy of Natural Sciences of Philadelphia

This report is based on a second lot of fishes secured in the Bahamas by Mr. Chaplin, to whom we are again indebted for this gift to the museum. Included is a small lot of crustacea. Of the 23 species noted in my report on his first installment,[1] 11 are duplicated in the present material, indicated herein by the prefixed asterisk. Unless otherwise stated they are labeled as from Nassau and Hog Island beaches, mostly from tide-pools, under rocks and in old shells, and collected in March, 1947. The collection comprises 61 specimens, representing 30 species or subspecies. Besides the two new forms, several are interesting additions to the Bahama fauna and others unusual growth stages. Besides the figures of the new species I have prepared several others of unfigured or little known species. References are cited under some species which have not been given previously, either in the Results of the Fifth George Vanderbilt Expedition (1941) [2] or my study of the Fishes of the Southern Piedmont and Coastal Plain.[3]

---

[1] Notes on Bahama Fishes with a description of a new Jaw Fish (*Opisthognathidae*). Notulae Naturae, Acad. Nat. Sci. Phila., no. 181, June 28, 1946, pp. 1-8, fig.

[2] Acad. Nat. Sci. Phila., Monographs no. 6, 1944, pp. 62-68, 433-451.

[3] Op. cit., Monographs no. 7, 1945, pp. i-vi, 1-408, figs. 1-313.

STERNOPTYCHIDAE

Sternoptyx diaphana Hermann

Sternoptyx diaphana Hermann, Der Naturforscher, vol. 16, 1781, p. 133, pl. 1, figs. 1-2: Observ. Zool., Fische, 1804, pp. 301, 328 (type locality, Jamaica)—Fowler, Bull. Amer. Mus. Nat. Hist., vol. 70, pt. 1, 1936, p. 241, fig. 113 (compiled); Acad. Nat. Sci. Phila., Monographs no. 6, 1944, p. 436 (Bahama reference).

One, 31 mm. Picked up after a storm on north beach of Hog Island, New Providence, February 1947.

CYPRINODONTIDAE

* **Cyprinodon laciniatus** Hubbs and Miller

Six, 30 to 50 mm. Pond at Oaks Field in nearly fresh water, New Providence. February.

One, 49 mm. Brackish irrigation ditches on northeast side of Lake Killarney, New Providence, February.

POECILIIDAE

* **Gambusia hubbsi** Breder

Three, 29 to 31 mm. (2 males and one female). Pond at Oaks Field in nearly fresh water, New Providence, February.

One, 36 mm. Brackish irrigation ditches on northeast side of Lake Killarney, New Providence, February.

HOLOCENTRIDAE

* **Holocentrus vexillarius** Poey

One, 58 mm.

ATHERINIDAE

* **Atherinomorus stipes** (Mueller and Troschel)

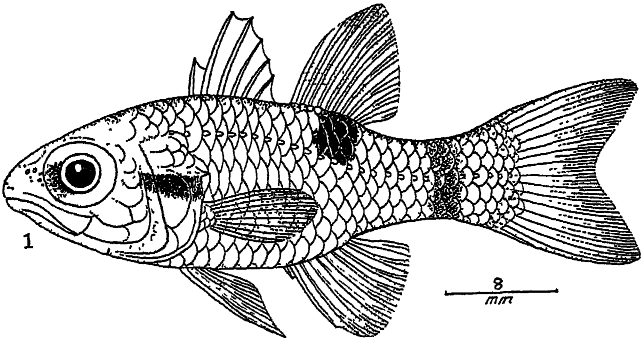
One, 68 mm.

SERRANIDAE

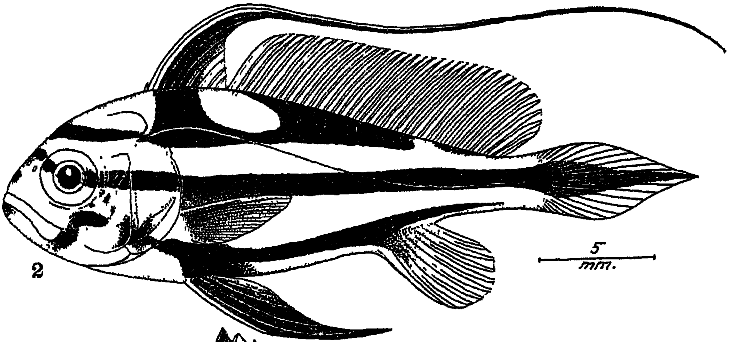
Serranus striatus (Bloch)

Depth $2\frac{7}{8}$; head $2\frac{1}{3}$. D. XI, 17; A. III, 8, I.

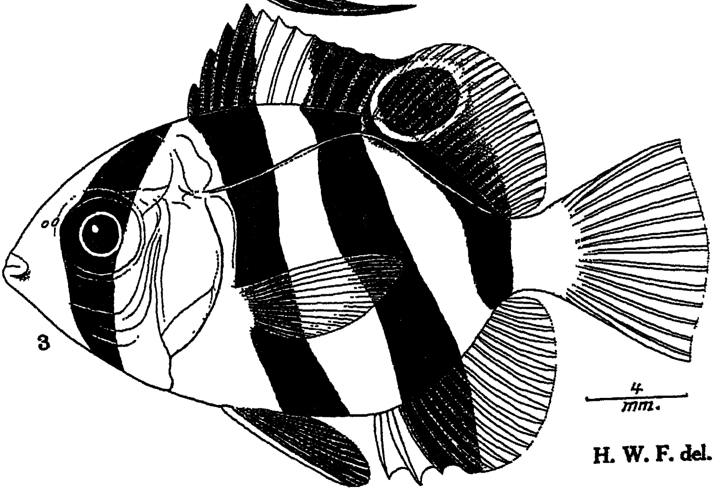
Color when fresh in alcohol brown, becoming slightly paler on under surfaces. Darker brown horizontal preorbital bar. Two darker brown horizontal bands across opercle, uppermost larger; third dark brown band from hind lower eye edge to subopercle and prepectoral; fourth from preorbital to interopercle; both third and fourth form more or less irregular convolutions on side of breast. At hind eye edge 2 small close set black spots and below another pair more wide set; a small black spot also on



1



2



3

Figure 1.—*Apogon binotatus* (Poey).
Figure 2.—*Pareques pulcher* (Steindachner).
Figure 3.—*Chaetodon striatus* Linnaeus.

opercle above; along lower eye edge 3 small black spots and a fourth close behind third on third dark brown band from lower eye edge. Trunk with 2 broad dark brown bands, reflected above on spinous dorsal; tail with 3 more, of which first 2 are reflected on last part of spinous dorsal and most of soft dorsal basally, also most of anal basally; third broad band embraces caudal peduncle and with black saddle above. Iris gray brown. Lips, maxillary and under surface of head drab. Dorsals dull brown, membranes of spinous fin each with yellowish brown tip. Outer half of soft dorsal pale or gray brown, with narrow yellowish brown edge. Caudal and anal like soft dorsal. Pectoral pale orange gray. Ventral gray, broadly paler to whitish along spine and along last ray.

One, 109 mm.

CHEILODIPTERIDAE

Apogon binotatus (Poey) Figure 1.

Color when fresh in alcohol bright vermilion, fading later to pink. Smaller specimen with dark saddle below second dorsal embracing most of dorsal base, only extends from posterior half of dorsal base in larger fish.

One, 28 mm. One, 48 mm. Tide pools to the south and under rocks, Layford Cay, New Providence.

LUTJANIDAE

* **Lutjanus griseus** (Linnaeus)

Color when fresh in alcohol dark olive brown generally, with 10 obscure transverse darker brown bands, each broader than interspaces. Narrow pale blue band from preorbital, along lower eye edge back to opercular flap. Mandible and under surface of head drab. Iris dark greenish gray. Incised ends of membranes of spinous dorsal broadly dull red, rest of fin dark gray. Soft vertical fins dark gray basally, suffused with pale yellowish and especially broadly yellowish on caudal; these fins pale grayish terminally. Pectoral pale yellowish green with transverse brown basal bar. Ventral with outer half pale reddish, yellowish on inner half. Breast and abdomen pale or light coppery, or with yellowish suffusion.

One, 85 mm.

POMADASYIDAE

Haemulon flavolineatum (Desmarest)

Three, 56 to 80 mm. All with dark brown axial lateral band, and another parallel black band above to below last soft dorsal rays, followed by rounded black caudal spot little smaller than eye.

One, 31 mm. From Layford Cay, New Providence.

SCIAENIDAE

Pareques pulcher (Steindachner) Figure 2.

One, 31 mm.

CHAETODONTIDAE

Chaetodon striatus Linnaeus Figure 3.

One, 28 mm. In *Tholichthys* stage.

POMACENTRIDAE

* **Pomacentrus fuscus fuscus** Cuvier

Three, 45 to 88 mm. Intermediate specimen with golden orange caudal. All dark to blackish otherwise than noted and show small or minute blue spots and specks.

* **Pomacentrus fuscus leucostictus** Mueller and Troschel

Two, 55 to 67 mm. Tail and caudal bright yellowish, with last fin and anal in larger bright chrome yellow. Both with black ocellus at last dorsal spine and at front of soft dorsal.

LABRIDAE

Halichoeres cyanocephalus (Bloch) Figure 4.

Labrus cyanocephalus Bloch, Naturg. Ausl. Fische, vol. 5, 1791, p. 139, pl. 286 (type locality, unknown).

Halichoeres cyanocephalus Meek and Hildebrand, Field Mus. Publ, no. 249. Zool. ser. vol. 15, pt. 3, 1928, p. 716 (Cuba; West Indies; Bahia, Brazil).—Fowler, Arquiv. Zool. São Paulo, vol. 3, art. 6, 1941, p. 173 (Brazilian records).

When fresh in alcohol the dark gray lateral band ill defined and broadens well out on caudal. Two dark rose bands connect eyes over top of head and triangular rose blotch extends from behind eye; 2 longitudinal rose bands along lower side of head. Scales on back and within dark lateral band each with rose or crimson bars. Iris rosy brown. Fins all with more or less rose tinge. Spinous dorsal with first 4 membranes dark gray, followed by median blackish blotch on sixth to eighth, above bordered by green longitudinal band extending to last dorsal ray sub-basally; soft dorsal with narrow dark gray submarginal line. Caudal largely blackish medially. Anal with basal row of pearly spots, one on each membrane. Pectoral greenish, axil dark gray. Ventral pale yellowish.

One, 98 mm. Not previously reported from the Bahamas.

* **Halichoeres radiatus** (Linnaeus)

Color in alcohol yellowish brown. Along middle of side 6 large diffuse or ill-defined dark gray blotches, simulating a lateral band, last at caudal base. Head above like back, lower third pale carmine and this color extends back below pectoral base back to under surface of caudal peduncle. From middle of snout above rose violet bar to eye and postocular blotch, followed by larger inclined blotch on opercle above. Muzzle above, jaws and cheek above yellowish brown. Iris dark brown. Dorsals basally yel-

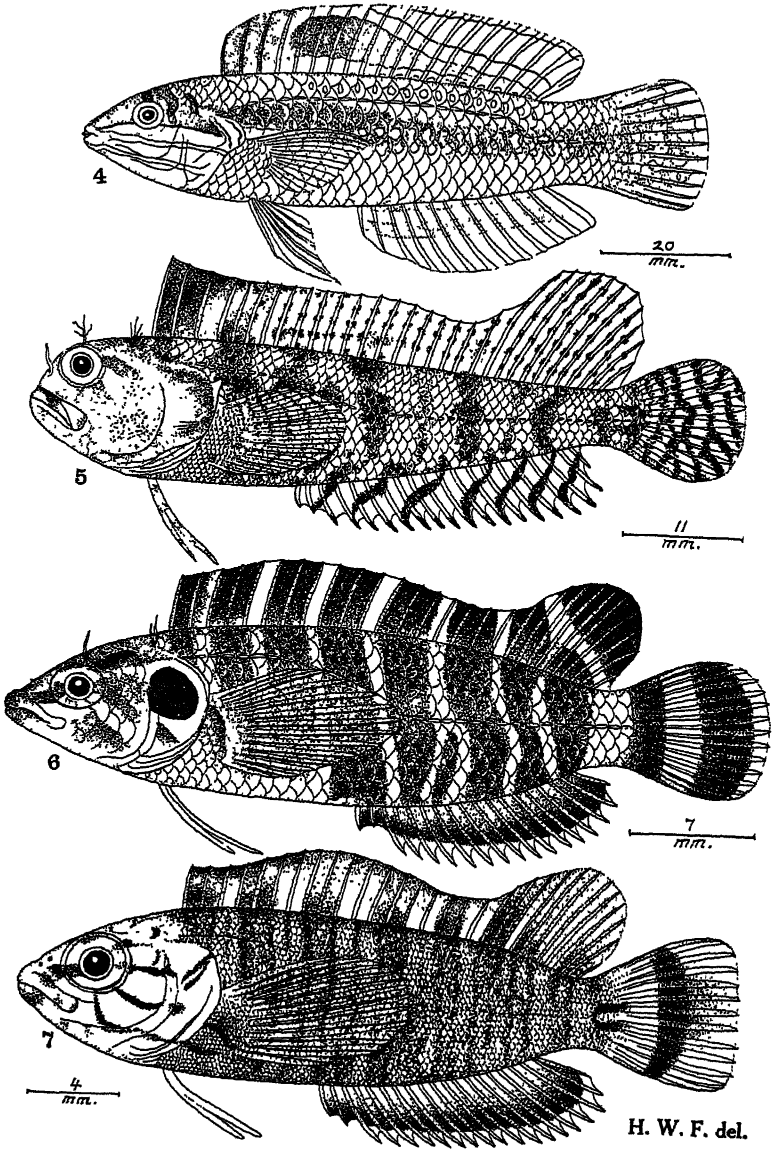

4
20 mm.
5
11 mm.
6
7 mm.
7
4 mm.
H. W. F. del.

Figure 4.—*Halichoeres cyanocephalus* (Bloch).
Figure 5.—*Labrisomus gobio* (Valenciennes).
Figure 6.—*Starksia oculata* new species.
Figure 7.—*Labrisomus bahamensis* new species.

lowish brown, with broad mauve median longitudinal band, darkened to blackish on first 4 membranes, and fin edge white. Anal salmon red, with lower edge white. Caudal largely yellow, upper and lower edges pearly, followed by gray olive submarginal band above and below much darker or gray black band. Pectoral yellowish, gray terminally and small black spot at fin origin. Ventral pale orange red.

One, 75 mm.

Halichoeres bivittatus (Bloch)

Two, 80 to 90 mm.

Thalassoma bifasciatum (Bloch)

Three, 63 to 77 mm. Also one, 100 mm. which resembles the Longley and Hildebrand Tortugas specimen photograph.

SPARISOMIDAE

Sparisoma pachycephalum Longley

Four, 44 to 79 mm. Apparently all without posterior canines. No black spot at pectoral fin origin. Coloration otherwise quite variable, but all show the 2 transverse dark bars across the chin or mandible.

SCARIDAE

Scarus croicensis Bloch

Two, 46 to 60 mm. Both with 2 parallel dark longitudinal lateral bands.

CLINIDAE

Malacoctenus macropus (Poey)

Scales 34 to 38 + 3 in lateral line; 2 or 3 above arch of lateral line, 6 or 7 below. D. XXI to XXII, 10; A. II, 19 to 20. Pectoral rays 15 or 16.

Color when fresh in alcohol brownish generally, usually paler below, with head and under surfaces often suffused with pale yellowish brown. Seven blackish blotches along back, last on caudal peduncle and 7 are reflected along dorsal base; from these 10 vertical dark brown transverse bands are given off to extend below. Iris dark brown. Large dark brown postocular blotch. Lower side of head with 4 darker brown vertical narrow bands, with narrower ones or lines in interspaces, variable and form reticulations on under surface of head. Several larger bars of brown traverse prepectoral, with 2 on pectoral fin base. Dark prepectoral bar present. Dorsals tinged with pale reddish basally, each spine with 3 or 4 brown spots. Caudal uniformly pale red basally, becomes grayish terminally. Anal reddish, becoming dark grayish marginally and free tips of rays pale. Paired fins pale. Ventral whitish, reaches second anal ray base. A single small filament above each eye.

Five, 34 to 49 mm. These specimens variable, as the apparent females are largely suffused with lemon yellow on the lower sides and under surfaces. Most have the soft dorsal rays with brown spots. Maxillary 3½ in head.

Labrisomus haitiensis Beebe and Tee Van[4] is described with the scales 45 in the lateral line, D. XX to XXII, 10 to 12, A. II, 20 to 22, the supraorbital cirrus palmate, the maxillary 2 in head, with the figure showing it reaching opposite the front pupil edge.

Labrisomus gobio (Valenciennes) Figure 5.

Clinus gobio Valenciennes, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 11, 1836, p. (292)395 (type locality, Antilles).

Gobioclinus gobio Gill, Proc. Acad. Nat. Sci. Phila., 1860, p. 103 (compiled account).—Jordan and Evermann, Bull. U S. Nat. Mus., no. 47, pt. 3, 1898, p. 2365 (copied Valenciennes).

Labrisomus gobio Longley, in Longley and Hildebrand, Carnegie Inst. Wash., Pub., no. 535, 1941, p. 257 (Bahamas and Cuba material).

Labrisomus heilneri (part) Nichols, Amer. Mus Novitates, no. 26, 1921, p. 2 (not fig. 2) ("smaller Bahaman speciman" sic Longley).

One, 66 mm.

Labrisomus bahamensis new species Figure 7.

Depth 3½; head 2⅞, width 2⅕ in its length. Snout 4 in head, conic, its tip nearly level with lower edge of pupil; eye 3⅓ in head, close to but not impinging on upper profile of head; maxillary inclined, reaches back nearly opposite front edge of pupil, length 3 in head; mouth cleft slightly arched and closed jaws even in front; teeth conic, front pair of each jaw largest, little curved, uniserial and others graduated smaller and inclined back along sides of jaws; few simple teeth on vomer; interorbital low, its bony width ½ of eye. Gill opening lateral, broad, membranes forming broad free fold over wide isthmus.

Scales minute, in more or less regular longitudinal series and inconspicuous. Scales in lateral line estimated at 62, posteriorly followed by 10 more nontubular and finally 4 on caudal base; 6 scales above front section of lateral line to upper edge of back, 14 above straight section; 18 scales vertically above anal fin origin, and 6 between base of last anal ray base and lateral line. Apparently no scales on head or predorsal. Chest, breast and prepectoral region with fine scales. No cirri on nape, nostrils or eye.

D. XVIII, 12, edges of membranes above entire, second dorsal higher than spinous fin, with penultimate spines shortest; A. II, 18, membranes with lower edges deeply incised behind tip of each ray; caudal 1½ in head, nearly truncate behind; pectoral large, reaches 1⅞ to caudal base and its length subequal with head, rays 13; ventral rays, 2, fin 1⅔ in head.

Color in alcohol dull brown generally, with slight olive tint. Nine distinct transverse darker bands, of which 3 before the anal fin, and all but last band reflected on dorsal fins basally. Second transverse dark band continues in postpectoral region and indistinctly across middle of belly. Also behind it is the extension similarly from the third dark transverse band. Of the dark body bands each is paired and marked with variable reticulations which more or less define pale rounded spots. In pale intervals separating the principal dark transverse bands are additional dark transverse bands, narrow above and somewhat expanded and double or paired below; these also with similar reticulations and definition of rounded pale spots. Last dark transverse band formed with dark arch at middle of caudal base and having each section or prong extended out on caudal basally. Head like general color of body, with 3 narrow dark to blackish bands given off from hind and lower edges of eye over cheek, opercle and subopercle. Dark preocular band from front side of snout and chin. Also several less distinct blotches on maxillary and under side of head. Median and lower postocular bands narrow, extend over lower prepectoral region, upper arched down behind. Iris grayish. As folded fins the dorsals appear blackish, but when elevated are seen to be dark drab or grayish. Anal like dorsals, except that end of each ray is whitish. Other fins all dull or grayish. Caudal with an indistinct median darker to grayish band and median rays similar terminally.

---

[4] Zoologica, Proc. N.Y.Zool. Soc., vol. 10, 1928, p. 232, fig. (type locality, Port au Prince Bay, Haiti).

A.N.S.P., no. 71734. Nassau Harbor, New Providence Island, Bahamas. March 1947. Mr. C. G. Chaplin. Length 32 mm. Type.

Apparently unique in its small scales, in combination with its coloration. It somewhat suggests *Labrisomus albipes* Fowler,[5] but that species has greatly larger scales, long ventrals and different coloration.

Perhaps the only species it would seem to approach is *Labrisomus microlepidotus* Poey.[6] This imperfectly described form is placed as a synonym of *Labrisomus nuchipinnis* (Quoy and Gaimard), after an examination of the types by Longley [7] with the statement, " Despite the alleged difference in squamation I can find nothing therein which separates the two ". Poey gives the scales in the lateral line as 110, a count certainly far in excess of that for *L. nuchipinnis*.

(Named for the Bahama Islands.)

Starksia oculata new species Figure 6.

Depth $3\frac{3}{5}$; head $3\frac{1}{10}$, width $1\frac{3}{4}$ in its length. Snout (in profile) $4\frac{1}{5}$ in head, tip level with lower edge of pupil; eye rounded, anterior in head, diameter 4, not reaching upper profile; mouth cleft little inclined from horizontal, with closed jaws even in front; maxillary reaches opposite front edge of pupil, length 3 in head; teeth in villiform bands in jaws, fine, uniform, bands narrowing posteriorly along jaws; small cluster of similar teeth on vomer; bony interorbital width about ⅗ of eye diameter, little convex. Gill opening lateral, broad, with united membranes forming broad free fold over isthmus.

---

[5] Acad. Nat. Sci. Phila., Monographs no. 6, 1944, p. 117, fig. 244 (type locality, Courtown Key, Caribbean Sea).

[6] Anal. Soc. Espan. Hist. Nat. Madrid, vol. 19, 1880, p. 246, pl. 8, fig. (outline head) (type locality, Cuba).

[7] In Longley and Hildebrand, Carnegie Inst. Wash. Pub. no. 535, 1941, p. 250.

Scales 33 + 2 in lateral line; 4 above upper section of lateral line, 6 above straight section on tail and 6 below to anal origin. Head with rather large scales on cheek. Chest, breast and prepectoral region scaled. Caudal fin with narrow basal band of scales. Supraorbital cirrus simple and 2 nuchal cirri each side.

D. XVIII, 10, penultimate spines shortest and fin edge entire; second dorsal higher than spinous fin; A. II, 16, fin edge deeply notched behind tip of each ray; caudal peduncle short, little free, its depth 3 in head; caudal 1½, convex behind; pectoral slightly shorter than head, rays 13; ventral rays 2, fin 1⅔ in head.

Color when fresh in alcohol with general color dull brown, lighter on belly and under surfaces. On body 8 transverse brown bands, darker than general tint, also much broader than the pale interspaces. These bands, though variable, largely conform on the two sides of the body and they are definitely extended over the dorsals, but little defined in the prevailing dark color of the anal fin. The head is ornamented with a blackish brown band extending from the side of the snout to the eye and over the postorbital region, broadening out on the preopercle, with the large rounded black opercular blotch behind and a narrowed bar obliquely over the lower part of the opercle and reflected on the branchiostegals. Below the eye on the cheek is another dark blotch. From upper hind edge of eye a black bar extends upwards in the brown area of the upper portion of the head. As viewed from above the head shows a median narrow paler band or line from the front of the snout back till opposite the hind edges of the eyes. Both lips broadly drab brown. Iris gray brown. Brown body bands extended on dorsals become black. Anal largely red basally with outer area blackish and ends of each ray finally white. Caudal white, with 2 black transverse bands. Pectoral pale brown, light to whitish basally, with a dark transverse prepectoral bar, fading brownish anteriorly.

A.N.S.P., no. 71735. Layford Cay, New Providence Island, Bahamas. March 1947. Mr. C. G. Chaplin. Length 42 mm. Type.

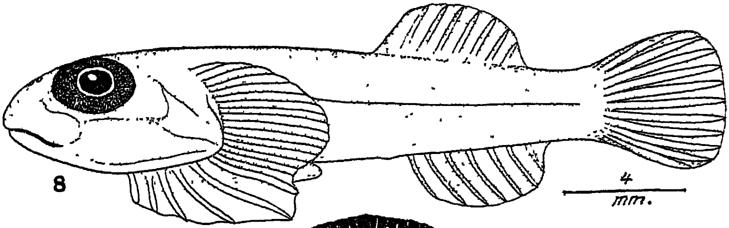
Apparently unique in its coloration. It approaches *Starksia ocellata* (Steindachner),[8] but that species has D. XXI or XXII, 7 to 9. A. II or I, 17 to 19. It also lacks the black blotch on the opercle and the two large transverse black bands on the white caudal. *Starksia fasciata* (Longley)[9] differs in having the D. XIX, 8 and A. II, 14, besides different coloration.

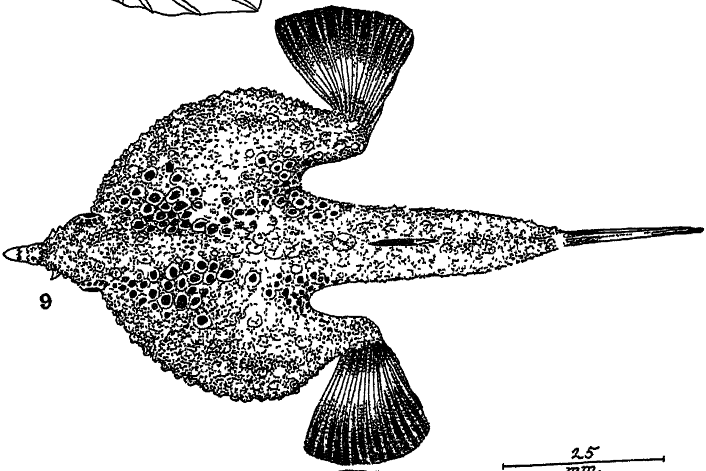
(*Oculata* eyed, with reference to the large black opercular blotch.)

---

[8] Longley and Hildebrand, Carnegie Inst. Wash. Pub., no. 535, 1941, p. 258 (Tortugas).

[9] Op. cit., p. 259 (Bahamas).


8


9

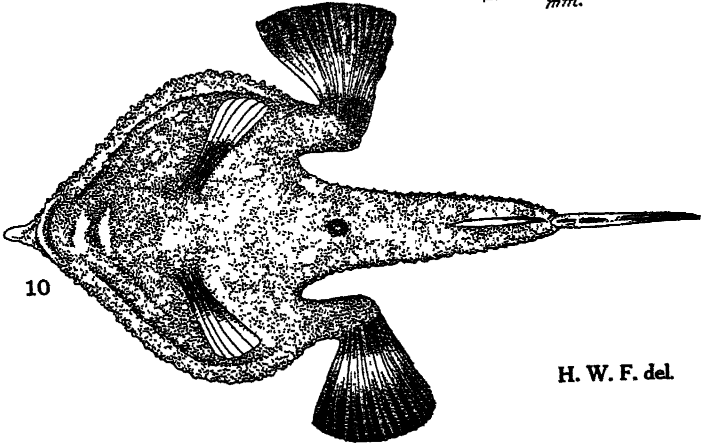

10

Figure 8.—*Gobiesox cerasinus* Cope.
Figures 9 and 10.—*Onocephalus nasutus* (Valenciennes).

BLENNIIDAE

Entomacrodus textilis (Quoy and Gaimard)

Salarias textilis Quoy and Gaimard, in Valenciennes, Hist. Nat. Poiss., vol. 11, 1836, p. (227) 307 (type locality, Ascension Island).

Salarichthys textilis Jordan and Evermann, Bull. U.S. Nat. Mus., no. 47, pt. 3, 1898, p. 2400 (Abrolhos Islands).—Nichols, N.Y.Acad. Sci. (Surv. Porto Rico), vol. 10, pt. 3, 1930, p. 382, outline fig. (Condado Rocks, San Juan).—Longley and Hildebrand, Carnegie Inst. Wash. Pub., no. 553, 1941, p. 269 (Tortugas).

Salarichthys textilis Fowler, Acad. Nat. Sci. Phila. Monographs no. 6, 1944, p. 473 (Caledonia Bay record).

Rupiscartes textilis Fowler, Bull. Amer. Mus Nat. Hist., vol. 70, pt. 2, 1936, p. 1050 (Ascension Island), p. 1362 (reference).

Entomacrodus nigricans Gill, Proc. Acad. Nat. Sci. Phila., 1859, p. 168 (type locality, Barbados).—Jordan and Evermann, Bull. U.S. Nat. Mus., no. 47, pt. 3, 1898, p. 2399 (based on Gill).

Salarias margaritaceus Poey, Mem. Hist. Nat. Cuba, vol. 2, 1861, p. 289 (type locality, Cuba).—Metzelaar, Rapp. Kolon. Curaçao, vol. 2, 1919, p. 158, fig 52 (Curaçao; St. Martin).

Entomacrodus margaritaceus Jordan and Evermann, op. cit., p. 2398 (possibly type of *Salarias margaritaceus* Poey).

Entomacrodus decoratus Poey, Synop. Pisc. Cub., 1868, p. 398 (type locality, Cuba).—Jordan and Evermann, op. cit., p. 2399 (based on Poey).

Depth 4¼ to 4⅘; head 4 to 4½. Front profile of snout nearly vertical. Eye 3½ to 3⅗ in head. Maxillary reaches opposite hind eye edge. Nostril with small flap ending in filament. Palmate fringed supraorbital flap present. Single short nuchal filament each side. Pair of small lower canines each side. D. XII, 14; A. I, 15 or I, 16.

Color when fresh in alcohol pale buff to olive buff. Body with 6 transverse dark brown bands, more or less paired. Small scattered pearly spots present on these bands and in the paler intervals. Also some scattered dark points on front of back. Head pale olive above, lower sides and below whitish, with several transverse gray bands behind eye and continued down over branchiostegal region. Median Y-shaped gray marking on chin. Iris gray brown. Fins more or less uniformly pale, with dark blotches on back reflected on dorsals basally. Dorsals with some pale gray spots on outer portions. Anal with white spots and submarginally gray against a narrow white margin. Caudal with 4 transverse gray bands, made up of spots on rays; base of fin pale yellowish or buff with 2 olive semicircles, one above the other. Pectoral whitish, with gray basal bar and longer prepectoral bar. Ventral white.

Three, 45 to 56 mm. Sandy Cay, New Providence, March.

BROTULIDAE

* **Dinematichthys cayorum** (Evermann and Kendall)

One, 45 mm.

CALLIONYMIDAE

Callionymus boekei Metzelaar

Callionymus boekei Metzelaar, Rapp. Kolon. Curaçao, vol. 2, 1919, p. 149, fig. 46 (type locality, Wacao, Curaçao).—Parr, Bull. Bingham Oceanogr. Collection, vol. 3, art. 4, 1930, p. 132 (Cat Island, Bahamas).—Longley and Hildebrand, Carnegie Inst. Wash. Pub., no. 535, 1941, p. 236 (Tortugas).—Fowler, Acad. Nat. Sci. Phila., Monographs no. 6, 1944, p. 451 (Parr's record).

One, 29 mm. measured to caudal peduncle, which together with caudal fin was devoured by a crab in the aquarium. Evidently a male with prolonged dorsal spines, of which second longest and first and third subequally shortest, the fin whitish with irregularly brown cross bands. Sides of head much more blotched or marbled darker than shown in Metzelaar's figure. Likewise there are 5 dark blotches, the first a transverse bar along lower side of head. Ventral blackish basally, with innumerable minute pearly dots and further out on the fin as narrow delicate transverse waved or broken pearly bars or lines, all more or less extending to the basal web. Pectoral whitish, with 5 transverse narrow dark bands. The species is distinctive in its preopercular spine, which is armed with 3 upturned spines above and one antrorse spine below.

GOBIIDAE

* **Mapo soporator** (Valenciennes)

Four, 32 to 78 mm. Largest uniformly dark, nearly blackish, and others all very pale or light brownish.

GOBIESOCIDAE

Gobiesox cerasinus Cope Figure 8.

Gobiesox cerasinus Cope, Trans. Amer. Philos. Soc., new ser., vol. 14, 1871, p. 473 (type locality, St. Martins, W.I.).—Jordan and Evermann, Bull. U.S. Nat. Mus., no. 47, pt. 3, 1898, p. 2336 (copied Cope).—Silvester, Yearbook Carnegie Inst. Wash. 1915, vol. 14, p. 216 (Guanica Harbor, Porto Rico).—Fowler, Proc. Acad. Nat. Sci. Phila., 1919, p. 143 (St. Martins, W. I.), p. 149 (Jamaica); 1928, p. 467 (Guanica).—Nichols, N.Y.Acad. Sci. (Sci. Surv. Porto Rico), vol. 10, pt. 3, 1930, p. 373, outline fig. (compiled).—Fowler, Acad. Nat. Sci. Phila., Monographs no. 6, 1944, p. 473 (Jamaica record).

Depth 5; head $2\frac{3}{4}$, width $1\frac{2}{5}$ in its length. Eye 3 in head, subequal with bony interorbital. Teeth conic, apparently uniserial in jaws. D. 8. A. 7, origin slightly behind dorsal origin. Uniformly rose carmine above, paler below and whitish on branchiostegal region.

One, 24 mm. Not previously reported from the Bahamas.

OSTRACIIDAE

* **Lactophrys trigonus** (Linnaeus)

One, 103 mm.

ONCOCEPHALIDAE

Oncocephalus nasutus (Valenciennes)

Figure 9 (dorsal view) and 10 (ventral view).

Malthaea nasuta Valenciennes, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 12, 1837, p. (337)452 (type locality, Martinique; San Domingo; New York).

Oncocephalus nasutus Fowler, Arquiv. Zool. São Paulo, vol. 3, art. 6, 1941, p. 184 (Bahia record); Acad. Nat. Sci. Phila., Monographs no. 7, 1945, p. 335 (Pensacola, Florida).

Above largely dull blackish gray, tubercles all more or less gray terminally. Rather large round close set black spots, more or less ocellated or separated with narrow whitish borders, forming a somewhat reticulated design about shoulders, gill opening and along side of tail. Entire under surfaces umber brown, variegated with irregular or variable pale creamy spots. End of rostrum pale. Iris whitish, marked with large blackish blotches or spots. Broad whitish border along upper jaw. Dorsal and caudal grayish to black, latter with broad white band. Anal brownish, with median pale bar and end of fin blackish. Pectoral pale to creamy basally, broadly black terminally. Ventral umber basally and on outer surfaces, broad inner terminal portion creamy.

One, 108 mm. New for the Bahamas.[10]

---

[10] My following short paper appeared as the present work was sent to press. A new skate from the Gulf Stream off East Florida—*Raja acanthiderma*. The Fish Culturist, vol. 26, no. 10, June 1947, pp. 73-75, 3 figs.

L. P. Schultz. *Emmelichthys atlanticus* a new genus and species of fish (family *Emmelichthyidae*) from the Bahamas, with a key to related genera. Journ. Wash. Acad. Sci., vol. 35, no. 4, 1945, pp. 132-136.

NOTULAE NATURAE

NUMBER 200 OF DECEMBER 12, 1947

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

OLIGOCENE AND LOWER MIOCENE MICROFOSSILS FROM ONSLOW COUNTY, NORTH CAROLINA

BY JAMES D. MCLEAN, JR.

Alexandria, Virginia

Abstract

Well samples from Camp Lejeune, North Carolina, show definite evidence of strata of Oligocene age from microfossil content. The lower (Trent) Miocene age of a sand sample from Silverdale, North Carolina, previously determined from macrofossils, is here confirmed by foraminifera found in the sample. A checklist of species is given.

Introduction

This study was begun at Louisiana State University by the author, who was aided by Dr. H. V. Howe of the Geology School in a preliminary evaluation of the species in the Camp Lejeune samples. These samples were given to the author by General W. P. T. Hill of the U. S. Marine Corps. It is owing to General Hill's interest and encouragement that the results here given are possible.

Because of the implications of the fauna found in the Camp Lejeune samples, it is thought advisable to make known the results obtained, in spite of the difficulty involved in making the faunal identifications, a difficulty due to the presence of a siliceous or calcium carbonate coat on the microfossils which covered some details of individual species.

Through the interest of Dr. Horace G. Richards of the Academy of Natural Sciences of Philadelphia, this study was aided in many ways. The sample from the Silverdale, North Carolina, locality was donated by Dr. Richards for comparative study. The foraminifera from this sample were so few in number that, had they not been isolated by carbon tetrachloride flotation, their small size and scarcity in numbers might have caused them to be overlooked.

All fossils listed in this paper and samples from the Camp Lejeune well are at the Academy of Natural Sciences of Philadelphia.

Acknowledgments

In addition to Dr. Howe, General Hill and Dr. Richards, the author owes his thanks to Dr. J. A. Cushman of the Cushman Laboratory for Foraminiferal Research and Miss Doris Malkin, paleontologist of the Shell Oil Company, Incorporated, for their identifications and opinions as herein quoted. Special mention should be made of the careful packing of the well samples and complete data prepared by Camp Jejeune personnel under the direction of Captain H. G. Bozarth, U. S. M. C., of that station. Finally, the author wishes to thank Mr. Ray Halsey former student of Louisiana State University Graduate School for his aid in preparing the slides of microfossils, and the Shell Oil Company, Incorporated, for its kindness in allowing Miss Malkin's work to be used here.

Locations and Condition of the Samples Studied

The Camp Lejeune well is located about four miles east of Jacksonville, North Carolina, at the intersection of Spring and Northeast creeks on the property of the U. S. Marine Corps Base, Camp Lejeune. The elevation of the well is 25.31 feet above mean sea level and the total depth of the well is 95 feet.

The Silverdale sample came from marl pits on the Gillette farm 0.5 miles southeast of Silverdale, North Carolina. Both locations are in Onslow County.

The Camp Lejeune well was drilled by cable-tool rig. The driller's log of this well corresponds essentially with the author's notes from samples in his possession, with these differences: the samples from 50 to 95 feet are light grey in color and contain black (phosphatic?) grains in greater or lesser percentage, as seen under the microscope. As mentioned above, the fossils of the Camp Lejeune well are covered with a coating of some substance which makes the identifications of the microfossils somewhat difficult. The only fossil-bearing portions of the well are the intervals of 60 to 95 feet, and of these the sample representing the 80 to 90 foot interval is barren of microfossils and of recognizable macrofossils. The fossil strata seem to resemble the description of the 88 to 111 foot level of Mundorff's well no. 35 (discussed below) and are sandy and indurated limestone, with pebble-size grains (very small gravel) present from the 80-90 foot sample.

The Silverdale sample is a fine sand with fragments of shell material, and the foraminifera are free of the coating found on specimens from the Camp Lejeune well.

Stratigraphy of the Camp Lejeune Well and the Silverdale Sample

The Camp Lejeune well is between two others which have been correlated (Mundorff, 1944; Richards, 1945) without recognition of any indication of Oligocene age. It is notable that in each instance there has been a question as to the relationship between the Castle Hayne Eocene and the Trent Miocene. Richards (1945, and personal communication) has said that there is a great deal of difficulty involved in establishing the separation of the Castle Hayne and Trent formations on the basis of the macrofossils and lithology.

Logs of the Camp Lejeune well and of two near-by wells are given below. The Tent Camp well is 1½ miles southwest of Jacksonville, N. C., and well no. 35 (Rural Electrification Authority Power Station) is about 5 miles southeast of Jacksonville.* The Camp Lejeune well (as stated above) is about 4 miles east of Jacksonville.

Tent Camp (Richards, 1945)	Camp Lejeune Well (Driller's log)	Well No. 35 (Mundorff, 1944)
0- 30′ Pleistocene Sandy clay.	0-40′ Pleistocene Sandy clay, coarse white sand.	0- 38′ Pleistocene Sand, clay.
-105′ Miocene Trent Sandy clay, limestone.	-60′ Trent (?); Croatan (?) Fine sand, clay.	- 73′ Pliocene (?) Sandy clay, sand.
-184′ Eocene (?) Castle Hayne (?) Limestone.	-95′ Oligocene Clay, shell, limestone.	- 88′ Miocene (?) Trent (?) Marl Sandy, fossiliferous limestone; sandy marl; phosphatic limestone.
		-253′ Eocene (?) Castle Hayne (?) Marl Sandy marl; sandy clay (marl?); sandy marl.

---

* Mundorff, 1944.

It is the author's opinion that the difficulty in establishing the contact relationships of the Trent and Castle Hayne has been due in some places to the presence of Oligocene deposits between the Eocene and Miocene, a possibility that has not hitherto been published. Miss Malkin says (personal communication) that the fauna discussed here has been recognized in wells in Carteret County and may be present in wells in Pender and Onslow counties. She adds that, owing to a downdip facies change, a different fauna of probable Oligocene age is found in wells farther east. In samples from the Standard Oil Company of New Jersey, Hatteras Light No. 1 well in Dare County, which were donated by the Standard Oil Company, the author has encountered no fauna which resembles that of the Camp Lejeune facies.

Dr. Cushman and Miss Malkin both indicate that the Camp Lejeune fauna contains Oligocene elements from 60 to 95 feet. They both found species in the 60 to 70 foot samples which have Miocene affinities, and Miss Malkin found Eocene elements in the 90 to 95 foot samples. The Oligocene elements are predominant in the entire 60 to 95 foot interval, however, and the indications are that the entire interval contains the same faunal group, with some admixture of Eocene and Miocene species. It is important to note that Cushman considers the entire interval to belong to the same faunal association, which he believes is Oligocene in age (personal communication). Miss Malkin considers this may be true also, although she believes the presence of elements of other ages in the samples should be taken into account.

Aside from the predominance of Oligocene species, which outnumber other elements, an important consideration is the presence of *Eponides byramensia,* which is used by Applin and Jordan (1945) as a characteristic species for the Florida Oligocene. *Eponides* cf. *vicksburgensis, Spiroloculina spissa, Virgulina vicksburgensis, Bolivina mississippiensis var. costifera, Angulogerina byramensis* and several other species are either widely known in, or are actual markers for, the Oligocene, being unreported elsewhere in the column. The *Ostracoda* are especially interesting in confirming the age, as they are quite characteristic for the Oligocene of the Gulf Coast.

The Miocene elements in the 60-70 foot interval may be due either to the existence of these species during Oligocene time or to mechanical mixture of the Oligocene and Miocene strata within the sample. The Eocene species present in the lower samples may also be due to mechanical mixture or to survival of the species into Oligocene time. Certainly the heavy preponderance of Oligocene species present in the Camp Lejeune well is not to be expected in Castle Hayne or Trent strata, and the Silverdale sample discussed below and assigned to Trent Miocene age on both macrofossil and microfossil evidence, bears no resemblance to the Camp Lejeune fauna on the basis of the microfossils.

Lithologically, and because of the absence on the Silverdale foraminifera of the coating substance found on Camp Lejeune species, the Silverdale sample does not remotely resemble those of the Camp Lejeune fossiliferous intervals. The driller's log of the Camp Lejeune well shows a fine sand with some clay and dark material. In the absence of fossils from this stratum, the author has assigned the unit to either Trent Miocene or Croatan Pliocene age. This fine sand, immediately above the 60-70 foot interval, is the only unit in the well that can even remotely be correlated with the Silverdale sample. It is regrettable that this interval proved barren of fossils in the Camp Lejeune well.

Macrofossils sent to Dr. Richards from the Camp Lejeune well were identified by him as shown below, but the identifications proved to be inconclusive for correlation purposes.

Macrofossils Identified by Richards

At 70-75 feet	At 90-95 feet
Calyptera aperta Solander	*Cardium* sp.
Anomia onslowensis Richards (?)	*Venus*(?) sp.
Balanus sp.	

The Silverdale sample which Dr. Richards sent the author came from a Trent Miocene bed, so far as the macrofossils are concerned (Richards, 1943). Miss Malkin's identifications of the Silverdale foraminifera proved to be confirmative of the Miocene age of this Trent sample (personal communication). Her identifications are as follows:

Elphidium poeyanum (d'Orbigny)
Elphidium incertum (Williamson)
Cibicides cf. *americanus* Cushman
Cibicides lobatulus (Walker and Jacob)
Discorbis valvulata (d'Orbigny)
Discorbis floridana Cushman

Significance of the Camp Lejeune Microfossils

As pointed out above, the Camp Lejeune fauna has been found in Carteret County and may be present in other wells in Onslow and Pender counties. The author failed to find this fauna in the Hatteras Light well No. 1 of the Standard Oil Company of New Jersey, but eastward from Carteret County a downdip facies of probable Oligocene age is present (Malkin, personal communication).

The geographic position of the reported occurrence of the Camp Lejeune fauna is such that the Oliogocene strata could be entirely limited to the subsurface, i.e., a wedge that does not crop out. The possibility also exists that the Oligocene occurrences are isolated pockets left as remnants of pre-Miocene erosion. As such, pockets of this nature could be considered to be relicts in situ or erosional concentrates of Oligocene sediments.

In any event, the presence of Oligocene species as here shown is of importance in that beds of this age have not been reported previously from North Carolina, although they outcrop in southern South Carolina and Georgia.

As will be shown in a later report, there are foraminifera present in the subsurface at Parris Island, South Carolina, that likewise indicate a possible Oligocene affinity hitherto unsuspected.

It is not, after all, so surprising that Oligocene deposits should be found in these areas; probably further studies will reveal them to be even more extensive than present indications show. In consideration of the work yet to be done on this question, it is not here proposed to name the Oligocene fauna, either as an assemblage or as a formation. Nevertheless, it is suggested that the presence of the faunal unit be recognized as evidence of the Oligocene age. It is thought that the contact between the Eocene and Miocene of North Carolina can be definitely interpreted only when the facts here presented are taken into consideration in studies of this boundary.

Microfossils Found in the Camp Lejeune Well

All species submitted to Miss Malkin and Dr. Cushman were not identified, due to the difficulty in making the identifications of coated specimens. The list below is not to be viewed as a conflict in faunal identifications, as neither contributor attempted to name all species found, or to name species not included in the other's work. In the list submitted to the Academy of Natural Sciences of Philadelphia for comparison with the microslides, the species are designated by the respective squares on the slides. As several species may and do occupy a given square on the slides, even an apparent conflict in numbers is not truly a conflict. The author was forced by lack of slides and press of time to so mount the species.

List of Species By Sample Depths

	Range of species (for ages cited only; range may be greater)		
At depth 60 to 70 feet FORAMINIFERA	Eocene	Oligocene	Miocene
#*[1]*Discorbis assulata* Cushman	1	1?	
**Pseudopolymorphina rutila* (Cushman)		1	1
#**Eponides byramensis* (Cushman)	1	1	
#**Globulina gibba* d'Orbigny	4	4	4
#**Cibicides vicksburgensis* (Cushman)		$\underline{1}$	
**Virgulina vicksburgensis* Cushman		$\underline{1}$	
**Gumbelina cubensis* Palmer	1	1	
**Globulina alabamensis* Cushman and McGlamery			
**Bolivina mississippiensis* Cushman var. *costifera* Cushman		$\underline{1}$	
**Angulogerina byramensis* (Cushman)		1	1
#**Spiroplectammina mississippiensis* (Cushman)	1	1	
# *Angulogerina* sp.			
# *Nonion pizarrense* Berry			2
# *Bolivina* cf. *paula* Cushman and Cahill		3	2
# *Pseudopolymorphina striata* (Bagg)			2
# *Globigerina* spp.			
# *Eponides antillarum* (d'Orbigny)		X	X
# *Cibicides* sp.			
# *Buliminella elegantissima* (d'Orbigny)		2?	2
# *Eponides* spp.			
# *Cibicides lobatulus* (Walker and Jacob)	4	4	4
# *Virgulina* cf. *punctata* d'Orbigny			2
# *Nonion* cf. *inexcavatum* (*advenum* var?)	4		
# *Valvulineria* ? *floridana* (cf. *Discorbis floridana*)	2	2	2
# *Cibicides* aff. *floridanus* (cf. *pseudoungerianus*?)	4	4	4, 2
# *Spiroplectammina* sp.			

[1] Symbols used in faunal list:

* Species identified by Cushman alone.
#* Species identified by Cushman and Malkin.
Species identified by Malkin alone.
1 Range of species according to Cushman and Todd 1946.
2 Range of species according to Cushman and Cahill 1932-33.
3 Range of species according to Cushman and McGlamery 1937.
4 Range of species according to Cushman 1935.
? Species whose presence in range chart is questionable due to identification difficulties noted in reference cited.
X Range of species noted by author from numerous sources.
5 Species reported from Oligocene by Howe and Law 1936.
6 Range of species according to Shimer and Shrock 1944.
$\underline{1}$ Underlined number indicates marker species or species reported only from given range.

	Range of species (for ages cited only; range may be greater)		
	Eocene	Oligocene	Miocene
OSTRACODA			
# *Cythereis* cf. *exanthemata*			6
# *Pyricythereis* cf. *israelskyi*	5	5	
# *Leguminocythereis scarabaeus* Howe and Law		5	
# *Cytheridea* (*Haplocytheridea*) *blanpiedi* Stephenson		6	
# *Pterygocythereis* sp.			
At depth 70 to 75 feet			
FORAMINIFERA			
# *Cibicides* spp. (small) cf. *americanus* (Cushman)		2	2
# *Bolivina* spp.			
# *Nonion* spp.			
# *Angulogerina* sp.			
At depth 90 to 95 feet			
FORAMINIFERA			
#**Discorbis assulata* Cushman	1	1?	
**Nonionella crassipunctata* Cushman		1	
#**Nonion inexcavatum* ?? (Cushman and Applin)	X		
**Globulina gibba* d'Orbigny	4	4	4
#**Nonionella hantkeni* (Cushman and Applin) var. *spissa* Cushman	1	1	
**Virgulina vicksburgensis* Cushman		1	
**Spiroplectammina mississippiensis* (Cushman) var. *alabamensis* (Cushman)	4	4	
**Nonionella hantkeni* (Cushman and Applin)	4	4	
**Valvulineria* sp.			
# *Valvulineria* sp. (cf. *Discorbis subaraucana*)			
#**Spiroplectammina mississippiensis* (Cushman)	1	1	
#**Nonion jacksonensis* (cf. *jacksonensis* by Malkin)	4		
**Guttulina problema* d'Orbigny	4		
**Spiroloculina spissa* Cushman and Todd		1	
# *Eponides* cf. *vicksburgensis*		X	
# *Cibicides* sp. cf. *pseudoungerianus* (Cushman)	4	4	4
# *Globigerina* spp.			
# *Cibicides* aff. *hazzardi*			X
# *Pseudopolymorphina striata* (Bagg)			2
# *Spiroplectammina* sp.			
# *Nonionella hantkeni* (Cushman and Applin) var. *fayetti* Cushman			

	Range of species (for ages cited only; range may be greater)		
	Eocene	Oligocene	Miocene
FORAMINIFERA			
# *Cibicides lobatulus* (Walker and Jacob)	4	4	4
# *Nonion* cf. *grateloupi* (d'Orbigny)			2
# *Eponides* aff *byramensis* (Cushman)	1	1	
# *Discorbis* cf. *assulata* (cf. *subpatelliformis*?)	1	1?	
OSTRACODA			
# *Cythereis exanthemata* and vars.			6
# *Cythereis blanpiedi* Howe		5	
# *Leguminocythereis scarabaeus* Howe and Law		5	
# *Bythocypris* ? *gibsonensis* Howe and Chambers	6	6	6
# *Cytheridea* sp.			
# *Cytherideis* cf *byramensis* Howe		5	
# *Cytheretta* sp.			

(And other species similar to those in sample 60-70 feet—Malkin.)

BIBLIOGRAPHY

APPLIN, E. R., and JORDAN, L., "Diagnostic Foraminifera from Subsurface Formations in Florida." Jour. Pal. Vol. 19, No. 2, pp. 129-148, 1945.

CUSHMAN, J. A., "Upper Eocene Foraminifera of the Southeastern United States." U. S. Geol. Surv. Prof. Paper 181, 1935.

CUSHMAN, J. A., and TODD, RUTH, "A Foraminiferal Fauna from the Byram marl at its Type Locality." Contr. Cushman. Lab. Foram. Res., Vol. 22, part 3, pp. 76-102, 1946.

CUSHMAN, J. A., and CAHILL, E. D., "Miocene Foraminifera of the Coastal Plain of the Eastern United States." U. S. Geol. Surv. Prof. Paper 175-A. 1933.

CUSHMAN, J. A., and McGLAMERY, WINNIE, "Oligocene Foraminifera From Choctaw Bluff, Alabama." U. S. Geol. Surv. Prof. Paper 189-D, 1938.

HOWE, H. V., and LAW, J., "Louisiana Vicksburg Oligocene Ostracoda." Dept. Conservation, Louisiana Geol. Surv. Bull. 7. 1936.

MUNDORFF, M. J., "Selected Well Logs in the Coastal Plain of North Carolina." N. C. Dept. Conservation and Development, Information Circular 3, (Mimeographed) 1944.

RICHARDS, H. G., "Additions to the Fauna of the Trent Marl of North Carolina." Jour. Pal. vol. 17, pp. 518-526, 1943.

————————, "Subsurface Stratigraphy of Atlantic Coastal Plain Between New Jersey and Georgia." Amer. Assoc. Petrol. Geol. Bull. 29, No. 7, pp. 885-955, 1945.

SHIMER, H. W., and SHROCK, R. R., "Index Fossils of North America." John Wiley and Sons Publishers, 1944.